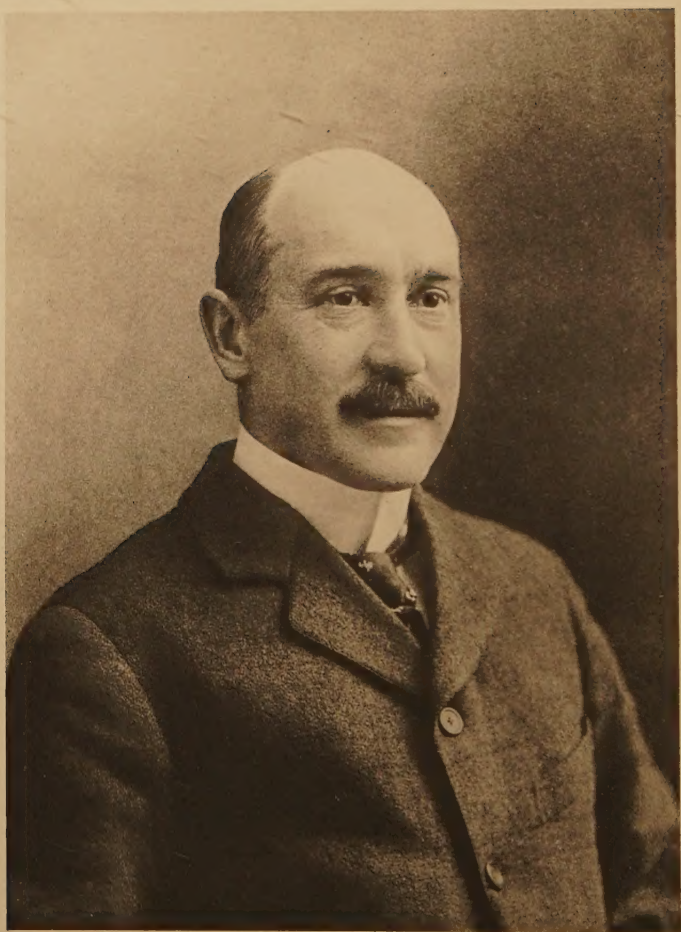


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Walter C. Kerr

A BIOGRAPHY OF WALTER CRAIG KERR

BY

ALBERT W. SMITH

DEAN (EMERITUS) OF SIBLEY COLLEGE OF MECHANICAL ENGINEERING
CORNELL UNIVERSITY

With Illustrations



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TO
LUCY LYON KERR
WHOSE HELPFUL COÖPERATION
MADE THIS BIOGRAPHY POSSIBLE

Walter Kerr is among the few who have left on me the impression of real greatness; especially in his conception and execution of important works of public utility, and in his views of the value and purpose of life.

ANDREW D. WHITE

FOREWORD

THIS volume has been made possible by the generosity of a distinguished member of the Society, Mr. H. Herman Westinghouse, who has left to the Committee, however, the privilege of issuing the finished book.

In performing its part, the Committee desires to express, on behalf of the membership of the Society, its deep appreciation of Mr. Westinghouse's thoughtful coöperation.

THE BIOGRAPHY COMMITTEE

PREFACE

IN the heart of every thoughtful man there are depths that even the closest friend can never sound. But a man may reveal, in the sight of men, exceptional traits of character, and may contribute to the welfare and beauty of the world. I have tried in this book to tell of such a man, with no attempt to make an exhaustive record. Walter Kerr had minor faults. Who of us all has not? But they were as nothing compared with his rare qualities of mind and heart, and his power of great accomplishment, which, all inadequately, are recorded here.

A. W. S.

ITHACA, N.Y.

October, 1926

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WALTER CRAIG KERR

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PART I BIOGRAPHY

WALTER CRAIG KERR

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CHAPTER I

HIGH TIDE

SOME men of distinguished achievement are so single in their natures that only their life-work interests them. There are others who add to their vocation, in which they win success, avocations which occupy their leisure hours, and require the exercise of natural gifts, thus giving interest and pleasure to their lives and charm to their companionship.

Then there are others — a few among all the millions — upon whom good gifts of mind and character are showered so generously that their avocations multiply and are limited only by the brevity of human life. Such a man was Walter Craig Kerr. Once in middle life he said to a contemporary: "At our age one must select the things one will do, out of many opportunities."

Walter Kerr was an eminent engineer and an organizer of exceptional ability. His main life-work — 1882-1910 — was done as inspirer and builder of the Westinghouse, Church, Kerr and Company organization, the first, and up to the time of his death, the largest of its kind. He was also for three years a teacher of engineering; he was a yachtsman who applied brains to sailing; he was an enthusiastic amateur biologist; a loyal citizen working for the welfare of his community; a lover of poetry and music;

a writer of verse. His judgment and advice were sought on a wide range of questions, especially those relating to civic betterment and education in which he took a deep and continued interest. He was a trustee of Cornell University and of Staten Island Academy. He was ever intensely loyal and affectionately attached to his family and his friends.

If he had centered his life's effort differently he might have been an eminent scientist, or a statesman, or a great educator, or a poet singing of the beauty of the world. But though these occupations might serve to fill his leisure, his real life had to be spent in the midst of vigorous movement, at the outer limit of human progress.

Men have in varying proportion power for thought and power for action; rarely has a man both in full measure. One may think effectively, and may make a clear record of conclusions; but another may be required to give these conclusions material form so that they shall contribute to human welfare. On the other hand a man may be a competent executive and yet be unable to conceive the plan that he executes.

Mr. Kerr combined exceptionally the capacities of the thinker and the doer. He took keen delight in solving difficult problems; they might concern engineering or commercial affairs, educational methods, the wonderful ways of plants and animals, the rate and direction of the tide currents of New York Harbor and their effect on the speed of racing yachts; in fact they might concern any matter whatever with a mental challenge and human interest. When he had reached logical conclusions on any subject, he enjoyed making clear presentation of his thought. He

had keen discrimination for facts and fallacies; he was a sound reasoner and an able interpreter. He did not rest here; in fact he never rested until he had turned his thought into action and action had resulted in final accomplishment. An intimate business associate¹ said: "Fond as he was of discoursing on an idea, he was fonder of taking hold of it and doing something with it." Mr. Kerr has expressed his idea himself: "These mental forces, like other forces, only do work when in motion. Hence your ideas are valuable only when put into execution; this often requires more talent than to originate them."²

He held exalted professional ideals; he would never deviate from sound principles in ethics or engineering; he changed the whole method of executing engineering undertakings to meet unprecedented development, and he raised standards of efficiency in construction and operation.

He always strove to develop the individual powers of those who worked with him or for him; he did not wish to impose his own thought as to method upon them, but rather to lead them to develop and use their own methods. This seemed a fundamental principle of coöperation to him, and he believed that the whole scheme of human life should be coöperative. When he had selected a man for certain work he held him responsible for results; for he wished to avoid checking any development of originality which, though it might fail, might also reveal some rare talent or even a spark of genius.

¹ E. H. Sniffin, Manager, Power Department, Westinghouse Electric and Manufacturing Company.

² From "The Point of View," an address delivered to one of the graduating classes of Stevens Institute of Technology, and later to the students of Sibley College, Cornell University.

A friend who disapproved of the way in which Angelo, Mr. Kerr's chauffeur, did a certain thing, once said: "Why don't you tell him to do that right?" The answer was: "Angelo doesn't think things out just as we do, and he must be allowed to do things his own way."

A young engineer who had an assignment asked Mr. Kerr what would result after the first step; then he came back to ask what would follow the second step; still again he came questioning. Then Mr. Kerr, with carefully suppressed impatience, said: "Go as far as you can see, and then see how far you can go." Yet, though he believed that for most thinkers this progressive unfolding of an engineering problem was necessary, he also had unbounded admiration for the man who, in contemplating complex problems, could see clearly the beginning, the middle, and the end.

Many men fail to recognize the relative importance of opposing factors in engineering problems. Here Walter Kerr had clear vision. When electrification of railroads entering New York City was under consideration, a group of eminent engineers met to discuss the questions involved. The relative merits of high- and low-voltage caused a long argument, especially as to the dangers involved in the two systems. Presently some one said: "Kerr, you haven't expressed an opinion; what do you think of these dangers?" He replied: "There are so many greater dangers necessarily involved in railroading that I don't think these are worth talking about." Time has proved the wisdom of this opinion; for both systems are in safe and successful operation.

Walter Kerr never lacked courage to undertake any job

that he believed could be done. That it involved great difficulties, or that it had never been done before, never daunted him. He always accepted the challenge of unconquered things.

Out of his experience and careful thought he often gave advice to technical graduates and young engineers. This further quotation from the address, "The Point of View," may help to an understanding of his mind and character:

Now that you have your so-called education, what are you going to do with it? . . . Begin by forgetting yourself; selfishness never produced anything better than more selfishness; it often breeds something worse.

We hear much about opportunities; they are everywhere plentiful. Remember that your opportunity is the little one that lies squarely in front of you; not the large one which you hope to find further along. Many a man is surrounded by opportunities who never seizes one.

Your first duty is always to that which lies across your path; the only step that you can take in advance is the next one. This leads to simplicity of action. . . . The refinement of thought which is apt to follow high training often leads the mind to overlook simplicity, and even to seek complexity. . . . It is thus easy to acquire that over-refinement often called "theoretical," as against the simplicity which is called "practical."

From one point of view all graduates can be divided into two classes: those who think their knowledge is a little too long for their opportunities, and those who think that 'most anything is a little too long for their knowledge. Both are apt to think that the knowledge they have acquired will become the essence of performance. You will soon find that knowledge does not have much to do with effectiveness. It is necessary only as words are to the expression of thought. You will find knowledge a good tool, but not the vital force with which you perform. You will fall back on human action and effort, and will discover that it is the human engine and not the knowledge engine that does the work.

Mr. Kerr frequently went through the offices of Westinghouse, Church, Kerr and Company inspecting the work; partly to keep up with the progress of all undertakings of the Company, but chiefly, no doubt, to keep in sympathetic touch with employees. He would stop here and there to ask questions. He knew practically all of his several hundred employees by name, even the office boys. This relation, together with his wisdom in selecting his head men, resulted in a very unusual *esprit de corps* in the organization. Even now, years after the merging and disappearance of Westinghouse, Church, Kerr and Company into another organization, and some years after Mr. Kerr's death, there is a large group of former employees who meet regularly at luncheon in New York, and for an annual dinner. These meetings are characterized by exceptional good fellowship, for the old spirit survives. In other cities, when W.C.K. men stop over, they hunt up others who have the company loyalty, and talk over old times when Mr. Kerr was at the helm with clear vision, signalling the engine room: "Full speed ahead!"

His sense of duty was all-compelling; services expected of him were rendered; excuses that would seem adequate to the rest of us failed to appeal to him. Once in the early stages of his final illness, when he had engaged to deliver an address in the evening, he was obliged during the day to undergo a painful and exhausting examination. His friends and family advised cancelling the engagement, but he would not; he gave the address and his audience never knew at what cost. His last public address was delivered, in spite of great suffering, at a Cooper Union Banquet held in memory of Professor Garcia just before he and Mrs.

Kerr left for the hospital at Rochester, Minnesota. A few days before his death he called for writing materials and, sitting up in bed, he wrote letters of advice and affection to members of his family.

During his last days in the office a member of the Cornell faculty went to New York to consult him, as a University trustee, concerning the welfare of a department. Mr. Kerr had an appointment with his physician later in the day. A business consultation detained him unduly, and the professor when called in said: "You should not delay your engagement with your physician to talk with me." "Well," he said, "it's too late for the doctor now anyway, so go ahead." Then he gave wise counsel despite the pain of which he did not speak.

His loyalty to his friends was strong and constant. One lifelong college friendship brought frequent occasions to test his loyalty which never failed. This friend once wrote: "There is a long account of kindness and consideration that I owe you that I have little hope of ever repaying. No friend of my life has ever been to me what you have been, and you have a place in my heart till death. God bless you and yours and reward you according to the measure of your true manliness."

A very successful engineer, inventor, and organizer, who received encouragement in his early career from Mr. Kerr, wrote him in 1902 giving a brief sketch of his work. The concluding paragraph of his letter was: "What I have written above is just preliminary to what I wish to say. Your interest in me gave me a broader view of life at a time when I needed it most; and while I may never be able to make return to you directly, I sometimes go a little out of

my way to help someone cling to the next higher round of the ladder of success. Had your interest in me been less real I might never have done this."

Another quotation from a recent letter further illustrates this quality of helpful friendship:

My family and I are deeply indebted to Mr. and Mrs. Kerr for financial assistance of the most generous kind, volunteered at a time when our fortunes, though not desperate, showed little prospect of a stable and developing future. This future was assured by Mr. Kerr. He also helped my brother through college, gave him invaluable advice, and employment that started him toward his successful life-work. In fact Mr. Kerr made life possible and hopeful for us at a time when the outlook was completely discouraging. But the most remarkable thing about this generous service was the manner in which it was rendered. In spite of our obligations to him, we always think of him first as a friend, and only afterward as a benefactor.

An eminent engineer ¹ in a recent letter, said:

He possessed, in a remarkable degree, the art of making friends of people in all classes of life; the habit of remembering people in connection with incidents, serious and humorous; and the ability to tell a good story which would fit well with current incidents or conversations.

Another friend ² writes:

I always considered Mr. Kerr one of my best, warmest and truest friends. We served together on the Race Committee of the New York Yacht Club from 1907 to 1910, and were subjected to considerable hardship and long hours. At such times his sterling qualities always showed to greatest advantage; there was never a question as to duties to be performed; they were done, and done cheerfully; it was a genuine pleasure to serve with him. Because of our sincere

¹ H. deB. Parsons.

² Ernest E. Lorillard.

friendship he was chosen to act as godfather for my son; I wish he could have been spared so that my son could have known him as I did.

A recent letter ¹ serves so admirably to illuminate certain traits of Mr. Kerr's character that it is quoted nearly in full:

We first met Mr. and Mrs. Kerr in the summer of 1899 at "Undercliff," the camp on Lake Placid where they spent many subsequent summers. We first knew him, therefore, when he was in holiday mood, and filled with his wonderful zest for living. To recall those days is to marvel anew at his youthful spirits and apparent enjoyment of the simple pleasure of the life there. He had ability to cast aside completely the burdens of life when occasion permitted, and to find resources for recreation and interest in whatever good things might be at hand. It was a gospel of relaxation that he preached and practiced more successfully, I am sure, than anyone else I have ever known; and so all-embracing were his interests, that wherever he might be, there were sure to be good things at hand. What a companion he was for young people! Indeed I can never hope to estimate what his friendship has meant to all of us in terms of broadened horizon and better understanding of life, as well as in terms of sheer enjoyment.

As I think over the many happy and profitable hours passed in his company, whether at the hospitable home at Dongan Hills, in the camp at Lake Placid, or in the merry little jaunts he loved to plan for spare hours in and about New York, I realize that Mr. Kerr was a creative spirit in the most difficult of all arts, the art of living. More than anyone I have ever known or known about, he seemed to hold the magic key to a satisfying life.

He was youthful in spirit. Not only did he retain his ability to play and to enjoy playing, but all his attitude toward life was that of a young man. He found life a wonderful adventure, and looked forward in the spirit of adven-

¹ From Miss Jean Lee Hunt.

ture welcoming each new experience and interest as he met it.

He was interested in people and understood them. I am sure that he felt genuine fellowship and affection for most of the men and women with whom he came in contact. Perhaps he would have said himself that this was because of his boyhood experiences at St. Peter, his native town in Minnesota, where living was reduced to fundamental realities; where human personality was more easily appreciable than it ever can be where life is softer and more sophisticated. But for this explanation to be adequate, one must appreciate the sympathetic and generous nature that was exposed to these influences. Certainly in mature life Mr. Kerr possessed the power of understanding the ambitions and desires, the problems and perplexities of other people and of sympathizing with them deeply.

On a country road in Westchester an old Italian used to run a little restaurant where he served most delectable open-air meals on summer days with supplies from his own garden and chicken yard. Mr. Kerr sometimes drove up there for dinner when the family were away from Dongan Hills for their summer holiday. The old man was a curious character, one of the most unattractive of human beings. Seeing him one would feel that his one claim to consideration was his ability to serve a good meal. But Mr. Kerr saw him through understanding eyes that divined human feelings underneath the mask of ugliness, and realized that loneliness and bitterness were in his soul. And so he encouraged him to talk of Rome, his native city, and the greatness of Italy, and how he hoped some day to go home. They were not illuminating or even amusing talks, but the pleasure and satisfaction that this exile in a strange land derived from the opportunity to pour out his reminiscences and state his views were eloquent testimony of the sureness of insight that prompted Mr. Kerr's inquiries.

This incident is typical of many that might be told; its interest lies chiefly in the evidence of that wonderful sympathy, generosity, and imagination that were Mr. Kerr's daily and hourly in his contact with people of every kind

and condition. To live so generously is in itself an achievement.

But aside from his buoyancy and his generosity of spirit, and in addition to the varied intellectual interests that made him so rare a friend and so stimulating a companion, he was one of the most original of men. To every situation, to every problem, he brought a point of view and a method of attack peculiarly his own. I assume that this was true of his business and professional life, and that it was one great reason why his advice was sought by so many people. It was pre-eminently true of his method of dealing with everyday situations, the trivialities and conventionalities of life. He was unconventional and it was because of the sincerity of his thinking. It was his habit of mind to decide all questions for himself on their merits. In everything he was more direct and fearless than a man with different habits of mind ever could be. This lent the quality of unexpectedness to his conversation and to much that he did, and it was a never-failing source of delight and inspiration. Even when one failed to agree, the challenge he continually made to unthinking thought was a fine tonic, and it was hard not to agree with him when once he explained his position.

Mr. Andrew D. White, formerly United States Minister to Russia and Ambassador to Germany, was associated with Ezra Cornell, the founder of Cornell University, and together they shaped the policy of the new University, of which Mr. White was the first President. He was one of the foremost diplomats and historical writers of his time, and a leader in the progress of higher education. He was President of Cornell during the seven years that Walter Kerr was a student and teacher there, and later they were colleagues for many years on the Cornell Board of Trustees. Soon after Mr. Kerr's death Mr. White wrote this letter:

I always enjoyed talking with him on any subject that

came up in his presence, and especially when we crossed the ocean together, sitting at the same table, and having many walks and talks together. In addition to clear knowledge, he had in an eminent degree a deep earnestness; and whenever he presented a report or made a speech, he threw not only his mind but his heart into it. Although at times both his writing and speaking were pungent and epigrammatic, these qualities were not at all at the expense of exact truth.

Others must speak of the qualities of his work as a leader in the field he had chosen. As for myself, I can only say that when I received publications discussing some of the greater enterprises which occupied him, I was filled with wonder at his daring, at the greatness of his resources, and at his power for effective work.

In his early death there has been a great loss not merely to his friends and to the University, but to the whole country; and with all my heart I lament it. He is among the few who have left on me the impression of real greatness in his conception and execution of great works of public utility, and in his views of the value and purpose of life.

In earlier years Walter Kerr was quite serious-minded, a result, in part, of the hard pioneer conditions of his boyhood on the frontier in Minnesota. But as he grew older with a widening outlook on life and people, his nature softened, his mood grew lighter, his sense of humor grew keen, and he smiled more than he frowned. "I have known him to laugh at things when he was fifty that would have annoyed him at thirty-five."¹

He had an unerring sense of the appropriateness of a humorous story to illustrate a serious question. Yet the lighter vein never interfered with concentrated earnestness when serious decisions were pending. Moreover, he

¹ From a letter by E. H. Sniffin, Manager, Power Department, Westinghouse Electric and Manufacturing Company.

was so serious and conscientious in everything he did that he was intolerant of the lack of these qualities in others.

Walter Kerr's remarkable memory may be illustrated by a letter he wrote to the Hon. Stewart L. Woodford:

In connection with the reproduction for publication of extemporaneous addresses, you may recall my mention of regret that something you said at Cornell about twenty years ago regarding Andrew D. White failed of record. It was on the occasion of the unveiling of the portrait of Hiram Sibley, when you responded for the benefactors of the University. What you said so impressed me that I believe that I can almost repeat it now. After preliminary remarks you spoke somewhat as follows:

"Who are called the benefactors of a great institution? Men who with philanthropic spirit give from their abundance. However worthy their motive, they give that which they do not need. This University was founded and endowed by a man, Ezra Cornell, who had succeeded beyond his fellows in the accumulation of wealth and he was a most liberal benefactor. Henry W. Sage, a man of purest motives, gave bountifully to the cause in which he was so deeply interested, but he gave what he did not need. Hiram Sibley, whom we honor today, in strong sympathy with the new education, gave with liberal hand from his surplus.

"But we have another, the greatest benefactor of all, Andrew D. White, born with a silver spoon in his mouth and cradled in the lap of luxury, clothed in the mantle of culture, and fitted by temperament, education and opportunity to move in the courts of kings, who came to this little town and on this hillside gave the best twenty years of his life to Cornell University."

In acknowledging this letter Mr. Woodford said: "I hardly know how to tell you how you have touched my old man's heart in remembering for twenty years what I tried to say when we unveiled the Sibley portrait in Ithaca."

Here is additional evidence of his unusual memory. Sometime in the late seventies a Psi Upsilon song was written by Professor Willard Fiske; his brother, a teacher of music, composed a setting for it. This song came to the Cornell Chapter in rough manuscript, and for a time was sung by the members, but no permanent record was made. Years later, when the story of the song was told, the manuscript could not be found. Appeal to the musical members who sang it failed. But when Walter Kerr heard of this failure, he reproduced the words and sang the song so that the music could be written. The song thus recovered was given to Professor Fiske who submitted it to his brother. Professor Fiske's acknowledgement was: "My brother writes me that the melody of the Chapter Song, as given to me by you, was exactly correct."

In the early days of President Schurman's administration at Cornell, Henry W. Sage was a trustee and benefactor of the University. He was a man of advanced years, but of great physical vigor. One morning he came into the president's office and Dr. Schurman asked: "How are you this morning, Mr. Sage?" With expanded chest and a vigorous gesture, he replied: "Power to let."

Mr. Sage's answer describes the impression that Walter Kerr's appearance produced. He was a man of medium height, well built, with outlines and motions that suggested lean tissues and energy in storage. Power to let!

He would sit very quietly while listening to statements of fact or theory, or while thinking his way to conclusions. If these conclusions were adverse he would turn to more interesting things; but if his faith and enthusiasm were awakened, he would rouse himself to action to give expres-

sion to his thought, and to set in motion agencies leading to realization.

Mr. Newell Lyon, Mr. Kerr's brother-in-law, writes: "Walter Kerr was sixteen years my senior. In conversation with him when I was about seventeen years old, I said: 'I have an idea, but I can't express it.' He replied: 'Then you haven't the idea; it is not an idea until you can express it.'"

His yachting, and his botanical and other scientific outings supplied in part his great need for physical activity; but the coming of the automobile was a godsend to him. He drove far into the country with his friends on summer evenings after exhausting days, and came back rested and refreshed.

His prompt method for turning thought into action is shown by the following story:

Once upon a time, in connection with a yacht-club outing, Walter Kerr and a party of ladies and gentlemen in evening dress went to dinner at the seaside estate of a friend. They landed from a yacht upon a float. When they were all on the gangplank that led to the utterly inadequate dock, the plank collapsed and dropped the whole party into the water, from which they waded or were fished out. Then, a dripping procession, they walked to the house where their host met them. "Mr. —," said Walter, "I will have a gang of workmen here tomorrow morning to build you a proper landing place." And so it happened. Later guests, coming to this place by water, walked up a safe gangplank of structural steel to a fine concrete dock, and did not have to dry their evening clothes before dinner.

If at a restaurant or banquet some item on the bill-of-fare pleased him especially, he was apt to seek out the chef and ask him for a lesson in his art; for he was very fond of savory food. Then he would try to produce the result on a chafing dish at home or at the Adirondack camp. Once his son Donald rowed him weary miles and back on Lake Placid in order to get a small bottle of cream that was lacking for some chafing-dish product. On the way back the bottle dropped and broke, but a portion of the cream was rescued in a fragment of the bottle and was strained through a napkin, and the experiment was carried to a triumphant conclusion. He was fond also of good wine. "But," says one who should know, "his control was always secure."

Walter Kerr greatly admired precious and semi-precious stones, for which he used to design settings. His family greatly prize various pieces of jewelry made from his designs. When traveling he often carried a small case of stones which by their beauty gave him personal pleasure, and the added joy of sharing their beauty with his friends. At home he often carried portions of his collection in his pocket, and rolled them out on a table now and then because the flash and color of them refreshed his spirit. The beauty of gems stirs various human emotions, but it is certain that Mr. Kerr's pleasure in them was that of the artist. Despite his enthusiasm for jewels and the design of their settings, he wore jewelry very sparingly.

He did not believe in seeking profit by chance in business or in social relations. Speculation did not appeal to him, nor did the playing of cards for money stakes. The idea of profiting by another's loss destroyed for him the

charm of social contact. He saw with concern the growth of the gambling spirit in business and in social life.

There was a time when the religious part of the nature of an Anglo-Saxon was the most obvious part; when he wore his religion on his sleeve. But the modern thoughtful man is apt to hide his deepest thoughts; and so there is difficulty now in recording a man's religious life.

Young people are inclined to accept the religious faith of their parents. The universe is all so new; the senses are so acute, and are sending such floods of messages into minds untrained for assimilation! There is little time for meditation, little experience upon which to base tentative conclusions as to what is probable in the midst of so much that is baffling and mysterious. And so they accept the torch that is handed on. For some this serves for light through life; but for others the torch dims and perhaps goes out. These are the ones whose maturing minds must think independently rather than accept the thought of others; who must light their own brighter torches. Eventually they evolve a belief in things as they seem to them, but their creed is always held open to change in response to new evidence or to flashes of illuminating thought. They may be deeply religious, but may avoid discussion of experience and contemplation that transcends logic. In some inner chamber of their hearts, where none may enter, they set up shrines to God as He reveals Himself to them.

It is quite certain that Walter Kerr passed through some such experience. He was born into an atmosphere of culture, where religion was a part of daily life; and it was so much a religion of service that his unselfish pioneer father and mother must have had little time for attention to

questions of theology. Walter was baptised by his father in infancy, and in early life united with his father's church (Presbyterian) in St. Peter, Minnesota. At Cornell he was a working member of the Christian Association and a regular attendant at one of the Ithaca churches. For a number of years he attended church with his family. Then, as the burdens grew heavier, as his need for Sunday rest and recreation increased, he would go out to the woods and hills and study nature, or lie in the sun.

The testimony of many great scientists shows that the study of nature and nature's laws tends to increase rather than to diminish not only the wonder at the marvels that the senses reveal, but reverence for Him "who standeth ever in the shadow keeping watch above His own."

It is certain that Walter Kerr, the lover of nature in her gentler moods, the dealer, as an engineer, with nature in her most uncompromising moods, the affectionate father of a responsive family, the upright and just administrator, the helpful, self-sacrificing friend, held a place in his heart for God.

Then, when he was about fifty years old, two shadows appeared and dimmed the far-reaching brightness of his life; the financial panic of 1907, which brought unforeseen business troubles to him, and the shadow of physical suffering which gradually darkened even to the end. Under this supreme test his courage and true manliness shone forth clear and undimmed.

His death came at the early age of fifty-one, on May 8, 1910.

If death were always woeful, all life would end in tragedy. To one who lives beyond the period of power, with declin-

ing zest, growing tolerance of inaction, and love of quiet places, death comes at last bringing welcome release. But Walter Kerr died at the very meridian of his power, just ready for greater accomplishments. One who knew him intimately said: "If he could only have lived to help in the world's greatest crisis!"

And yet his friends cannot imagine him without the zest for action; old age could never have fitted his indomitable spirit.

His work was not finished; and yet those — they are a multitude — who caught inspiration from his mind and character will carry it on.

CHAPTER II

HEREDITY AND EARLY LIFE

MINNESOTA became one of the United States on May 11, 1858; on the 8th of the following November Walter Craig Kerr was born in St. Peter, a new town of this new state, where a real-estate boom was fading away.

St. Paul was the Territorial Capital of Minnesota, and was most in favor for the State Capital. But a land and real-estate company, called "The St. Peter Company," made unremitting efforts to have St. Peter made the Capital City, and a most dramatic and exciting contest followed. A bill for removal of the Capital to St. Peter was introduced in the Territorial Legislature on February 6, 1856. After a strenuous fight this bill was acted on favorably, subject to final action by the Legislature, and was enrolled by the Council. The original and enrolled bills were to be submitted for final action the next day, and were placed in the hands of the chairman of the committee on enrolled bills, Joseph Rolette. Then the friends of St. Paul arranged for the transfer of Mr. Rolette, with the fateful bills in his possession, to a room in the topmost story of a house in St. Paul where he was supplied with everything he needed or desired except liberty. Hence he was absent from succeeding meetings of the Legislature, the bills were not forthcoming, copies were not accepted, and St. Peter lost its chance for greatness.

In this frontier town of disappointed hopes, whence there was an exodus of many of the stronger ones to more



WALTER KERR
A Boy in Minnesota

promising lands, Walter Kerr spent his boyhood. Indians were a familiar sight in the streets of St. Peter as they journeyed to and from their winter quarters in the Big Woods east of the Minnesota River, and Walter as a child of about four years must have felt something of the excitement and thrill of the Indian War of 1862.

St. Peter must have been a place of strenuous pioneer struggle, with abundance of local products, but scarcity of money and the things that only money could buy. These were conditions to bring out the temper and quality of a man, and favorable to laying firm foundations of character.

It is related that a far-away ancestor of Walter Craig Kerr, named Walter Ker, was banished from Scotland in 1685 on account of his decided religious views. He landed at Perth Amboy, New Jersey. It was chiefly through his efforts as a leader that the old Scots Presbyterian Church was established near Freehold, New Jersey. The present church is the second on its site; the original church, built of logs, stood not far away. His tombstone near the church records his death in 1748 at the age of 92 years. The record tells of him as a man of decided opinions and of great force of character.

Walter Craig Kerr's paternal grandfather, Aaron Hervey Kerr, was born and grew to manhood in New Jersey where he served three years in the State Legislature. Later he went to live in Washington County, Pennsylvania. For seven years he represented the Whig party in the Pennsylvania Legislature, and was a member of the Constitutional Convention of 1838. He was a successful merchant as well as a politician.

The maternal grandfather was Walter Craig, who came to Pennsylvania from the north of Ireland as a lad, and who became a surveyor and assisted in the survey of a portion of Washington County. Later he became a merchant, journeying through the length of the state to Philadelphia to buy goods which had to be transported part way by canal, and part way by teams over the mountains. This was an experience which, compared with present methods, must have been a real adventure, well suited to the spirit of a North-of-Ireland man. He also was a member of the Pennsylvania Legislature for several years, was a member of the Constitutional Convention of 1838, and a soldier in the war of 1812. It may be inferred without record from his place of birth, that he was a Democrat, and thus the two grandfathers may have come into political antagonism; if so, it was clearly without serious consequences.

All four of the grandparents were of strong Christian character, loyally devoted to their country and their church.

Walter Kerr's father — also Aaron Hervey Kerr — as a boy was a clerk in his father's store, and in due time went to Jefferson College ¹ at Canonsburg, Pennsylvania, where he was graduated in 1843. He then took a course in the Union Theological Seminary at Allegheny, Pennsylvania, finishing in 1846.

In October, 1847, he married Elizabeth Craig, and they started out together to begin their adventurous life. They went down the Ohio River to Madison, Indiana, thence to Indianapolis over the only line of railroad then in the

¹ This college was united with Washington College in 1869 under the name of Washington and Jefferson College, at Washington, Pennsylvania.

state, and thence by stage to a place near South Bend, where they established their first home. There Mr. Kerr organized a Presbyterian Church and preached for several years. This locality proved to be malarious and, because of illness, they went in 1852 to Dubuque, Iowa, where Mr. Kerr became professor of Latin and Greek in the local college. Here their only daughter was born.

In their pioneer hearts they felt the lure of the great Northwest, and in the autumn of 1857 they went to St. Peter, Minnesota, where Mr. Kerr became a home missionary of the Presbyterian Church. Here they labored together for twenty-three years. Three sons were born to them in St. Peter, of whom Walter and Henry lived to manhood.

At the beginning of the war in defense of the Union, Walter's father became Chaplain of the Ninth Minnesota Regiment. He served through the war and was universally beloved and trusted by all men with whom his lot was cast, especially because of his work in the field and in the hospitals. He was a large man and he rode a large powerful black horse. It is told that he would ride out on battle fields, and dismounting, would put two or three wounded men on his horse and transport them to comparative safety in field hospitals. Here is one of several similar reports made by Colonel I. T. Marsh: "I cannot pass unnoticed the untiring efforts of our worthy and much esteemed Chaplain, A. H. Kerr. He visited the battle field several times during the engagement, doing all that could be done to relieve the sufferings of the wounded, and assisting in carrying them from the field. When the battle was over he returned to the hospital where he remained several

days procuring and dealing out luxuries and comforting the wounded."

When the regiment was marching homeward after having been paid, Chaplain Kerr, who had been intrusted with a considerable sum of money belonging to the men, was riding far in advance of the regiment with two officers. They were held up by guerrillas who ordered them to deliver their money and valuables. Chaplain Kerr had his personal money in two pocketbooks while the money belonging to the men was in a third one. He put both hands in his pockets; the hand from the pocket containing the money of the men came out empty, while the other hand brought out his personal money in two pocketbooks, one of which he dexterously transferred to the empty hand. Thus he delivered his own money to the bandits, but saved the money held in trust for the men. They took his big black horse and his gold watch also. Then they told the plundered officers to stand without moving for half an hour. The leader said: "Don't stir, for you are watched." And Chaplain Kerr, his sense of humor surviving the excitement, replied: "Just let me have my watch and we will stay forty minutes." After the guerrillas had gone, he said to his companions: "There are \$750.00 in my pocket belonging to the men that they did not get!"

He was a large man in every sense, and he was filled with a spirit of broad and loving helpfulness, standing always firm for his convictions of right, but ever most charitable toward the opinions of others. That he was zealous in the service of his fellow men, that he was trusted by them implicitly in matters requiring judgment and strict integrity, is shown by the fact that in 1866 he became a trustee, and

secretary and treasurer of the State Hospital for the Insane at St. Peter. His success in this work led to his being put in charge of the construction of a similar hospital at Rochester, Minnesota, where he lived after his retirement. He was one of the stewards of this hospital from 1878 until just before his death in 1890. He was also at one time for five years County Superintendent of Schools. In addition to his regular work, he volunteered help often to weak and struggling churches in his vicinity, and never spared himself in serving them. His kindly nature and charitable spirit insured to him pleasant relations with Christians of every communion and with people of no church connections.

One who as a boy attended Mr. Kerr's church in St. Peter, wrote in 1912: "He was a man of high character, of great dignity and self possession. When I look back and compare him with clergymen of high and low degree with whom I have come in contact during the past forty years, he stands out well to the front both as a man and a minister of the gospel."

Walter Kerr's mother was a fit helpmate for her pioneer husband; she lived for others an entirely unselfish life. In addition to her work with her husband, which must have been strenuous and time absorbing, she always made the friends of her children welcome and happy in her home. She was fond of mathematics and most persevering in mastering difficult problems. This was not only helpful to Walter in his early training, but it was an object lesson in overcoming difficulties that remained with him through life. She took a deep interest in astronomy, especially in its mathematical computations. Walter's love for this

science began when he and his mother sat out-of-doors on clear nights while she talked to him about the stars. She gained the culture which comes from a lifelong habit of reading, and found time for her books despite her many exacting duties as the wife of a frontier minister. The mother and son were much alike in temperament, both positive, both seeing the end from the beginning and believing that things undertaken must succeed. Both were strong willed, yet the mother often said that her will and opinion bent as a reed before his.

The childhood home was small and plain, but a place at table and a welcome for a stranger were never wanting. Walter held this home in tender memory throughout life. One day, about four years before his death, he took from a special corner of his big desk some simple relics of his childhood home, and laid them gently without a word in his sister's lap.

When Walter was four years old he was taken by boat on the Minnesota River to St. Paul. His father led him to the lower deck where he was so fascinated that there was difficulty in getting him to leave all the interesting things. When they were at home again he drew on his school slate a cross-section of the boat locating the cabin, stairways, decks, and the engine and boiler. Before he was six years old, having seen the interior of a grist mill, he constructed a small mill out of strips of wood with troughs running downward, across and back, through which he caused white sand to run in lieu of the flour in the real mill.

Many of the long hours of the winter days he spent at his first work bench, a board resting on two chairs, where he delighted to work with his few tools, mending broken toys

and contriving and making such things as were possible with the meager materials at hand.

At the age of twelve years he worked at shingling houses, and soon afterward took regular contracts for carpenter work. He enjoyed working with his hands, and throughout his life kept a chest filled with fine carpenters' tools. In the early days in his own home he had an attic workshop where he built and upholstered various pieces of furniture.

Walter developed early an ability to lead, directing others even in their play. It was always he who devised and constructed apparatus that was needed for school sports; but his schoolmates did not realize his capacity and eagerness in thinking out and proving natural laws until they began the study of Steele's "Fourteen Weeks in Natural Philosophy." Then they learned that he had absorbed the entire contents of the book, and had gone far beyond it in reading and experimentation. "In fact," says one of his schoolmates, "during the rest of his school course he was teacher of physics both to pupils and faculty."

The St. Peter High School was organized in 1871, when Walter was about thirteen years old; there is testimony that it was an excellent school with able teachers of fine character. Therefore Walter had good opportunity for a thorough grounding in studies preparatory for college. This was supplemented by help at home from his father and mother, and was made especially effective by his never failing eagerness and industry.

Walter's innate love of nature led him as a boy to spend much time in the open, and to cultivate habits of observation which were exercised with increasing enthusiasm into

middle life. Also he loved animals, and especially shared his father's affection for fine horses. He delighted in vigorous sports like hunting, fishing, skating and baseball, and his physical pleasure was always associated with the desire and determination to succeed and to excel, though this never resulted in ill temper when he failed fairly after doing his best.

There is testimony from numerous sources that Walter was a manly boy, always fair, just, and considerate. An intimate friend of his boyhood said after forty years: "If he ever did a mean thing when we were boys together, I certainly do not recall it!" Walter Kerr's heredity was rare and fortunate. His opportunities as a boy were really quite exceptional. His parentage and home training left nothing to be desired. Though St. Peter was only a village of about three thousand inhabitants, it included such men as Henry A. Swift, Horace Austin, A. B. McGill, and, among the younger men, John A. Johnson — who was a schoolmate of Walter's. Each of these men became Governor of Minnesota; and Johnson has been prominent in national affairs. Thus Walter's early associations were of a kind to stimulate a boy's ambition.

In those days the comforts and luxuries that only money can buy were mostly wanting in St. Peter, especially in the home of a minister all of whose congregation had to struggle for a meager livelihood, and whose salary must have been very small. Yet this very lack of things needful for the development of an artistic nature doubtless acted as a spur which helped Walter toward success.

One day at the camp on Lake Placid Walter Kerr, coming up from an improvised carpenter shop, said to a friend:

“Well, I’ve had a good morning; I’ve been back at my old trade. In St. Peter we had to work, some of us when we were quite young. I learned to do carpenter work when I was a boy. I don’t know any kind of work that is more satisfying, and I have always been glad I had that experience; it has been of practical advantage to me all my life, a great help in understanding other types of work. Then too, having a trade gives one a comfortable independent feeling.”

Out of this frontier life Walter Kerr came at the age of seventeen with sturdy health, with an eager mind, a warm heart, and a developing love of beautiful things both from the hand of God and from the thought and skill of man. To those born into homes of luxury, on whom no demands had been made for hard helpful service, he would doubtless have seemed somewhat crude. But through this exterior there shone forth the inborn refinement that characterized his whole life. He certainly won his place by merit and became a man of the world in the finest sense.

CHAPTER III

AT CORNELL UNIVERSITY

WALTER KERR entered Cornell University at the beginning of its eighth year, in September, 1875. Cornell was young, it was radical, it was limited in buildings, laboratories and equipment and its library was small. There were only about five hundred students, and the faculty numbered about fifty.

Cornell was hallowed by no traditions, it had no past; but it took hold on the future. It had all the vigor of youth, and it was filled with the spirit of Ezra Cornell and Andrew D. White.

Ezra Cornell had won his way, by sheer ability and force of character, from a boyhood of limited opportunity, filled with labor and hardship, to a manhood of influence and wealth. He considered that his wealth was held in trust; that it carried an obligation for use for human welfare. He knew of the struggles and ambitions of young men and women of ability and straitened means, and he wished to provide for them increased opportunity for higher education.

Andrew D. White was born to luxury, but with the gift of love for his fellow men, and enthusiasm for education. He became an able scholar and a professor of history; and in acquiring scholarship, was impressed with the narrowness and inefficiency of the colleges, and he wished to use his powers to work reform.

These two men became members of the Legislature of



WALTER KERR AS PROFESSOR

the State of New York at the same time, and colleagues on the Committee on Education. The Morrill Land Grant Bill had just become a Federal Law.

Out of these circumstances came Cornell University with its radical ideas, which in fifty years have won universal acceptance.

Walter Kerr's mother read of this new University, of its opportunities for training in mathematics and engineering, and, sure that it was the right place for her son to study, she sent for a Cornell Register. When it came Walter was at work shingling a house. Without waiting for whistle time, she sent for him, and together they studied the courses offered and the entrance requirements. It was found that Walter was not fully prepared in mathematics. The time was short — only a few weeks till the opening of the University — but, undaunted, Mrs. Kerr started an intensive course to complete the preparation. Ways and means were provided for, certainly not without home sacrifice, and Walter went forth to meet the world.

Many of the early students of Cornell were of the kind that Mr. Cornell wished to help; poor in purse, but rich in vigor of mind and body, filled with enthusiasm for the world they were facing, and wanting to meet it with their full native power trained for success. There were others, too, from homes of luxury, but almost invariably with earnest purpose, attracted by the ideas of Mr. White.

The faculty also were in sympathy with the same liberal ideas, and were a rare and able group. In 1875 the influence was still strong of men like Goldwin Smith who came from Oxford to cast his lot with Cornell, and of Louis Agassiz, James Russell Lowell, and George William Curtis,

who were non-resident lecturers; while Sibley College of Mechanic Arts, where Walter Kerr's work was chiefly done, was most fortunate in having a man ahead of his time in machine design and construction, John E. Sweet. There could hardly have been a more stimulating atmosphere than that of early Cornell for a young man of Walter Kerr's heredity and training.

Despite the ideals of democracy, the students formed into groups (as human beings must, as long as there are differences of ability, of taste and of mental and physical charm). The Greek letter fraternities were established and only the elect might enter their mystic halls. Walter Kerr did not join a fraternity in his freshman or sophomore year; but in two years as a student he established a reputation that resulted in his being invited to join Psi Upsilon and he accepted. His roommate during his upper class years writes: "The fact that he joined the fraternity in his junior year is an indication of the impression he had made on his fellow students. Fraternities often make mistakes in choosing freshmen, but they seldom take an upper-classman unless he has shown special qualifications that mark him as above the average. Immediately after joining Psi Upsilon he became a factor in the management of its affairs, and in his senior year was the one to whom we all looked for direction in all fraternity undertakings." Moreover his fraternity brothers used to come to him for advice in personal matters, relying on his judgment and common sense. Several of them on receipt of money from home, knowing their weakness for quick and foolish spending, turned over their money to him with instructions to hold it unless, in his judgment, they really needed it.

In pure mathematics, preparatory to the applied mathematics of the engineering courses, there was in the Seventies an "Honor Section" in Calculus, for which a few who had shown marked ability were selected. The quality of Walter's work in this course was such that the professor in charge excused him from all examinations, and told him that he need not attend classes when it was inconvenient; such was his confidence that in any case Walter would do the work thoroughly. In 1909 this professor wrote Walter Kerr on a matter of business. This is the closing paragraph of his letter. "Among the thousands of students who have come under my instruction here at Cornell, there is no one of whom I have a pleasanter memory than of you. What a splendid record you have made!"

In those early days the faculty members of Psi Upsilon included President White, Goldwin Smith, Willard Fiske, Judge Francis M. Finch, afterward Dean of the Law School, and seven other distinguished professors. Fraternities used to hold literary evenings to which they invited faculty members and out-of-town guests of the University. At one of the Psi U. literary evenings there were present, President White, Goldwin Smith, Bayard Taylor, Mark Twain, Reverend Joseph Twichell and others. Walter Kerr had been appointed to present the principal paper, and he read an original poem. The president of the chapter of that time wrote recently (1925): "This poem was long and interesting; it held the distinguished audience, and astonished us all. I can still see Mr. Goldwin Smith as, with his frosty smile, he stepped up to congratulate the poet. Later in the evening President White said to me: 'You were right about Kerr; he is a notable man.' I think

that was Walter's first triumph; it opened all the social doors to him."

The imp of mischief was not a total stranger to Walter Kerr. Moreover this imp was a constant companion of Gus Parke, who was one of Walter's intimate student friends.

In those days there was a professor of history who was a man of great dignity and severity of judgment. One day he sat at his lecture desk facing a large class. He began in deep, sonorous voice: "And now we come to the bombardment of Constantinople." Just then beneath his desk a pack of fire-crackers went off in true Fourth-of-July fashion, shattering the scholastic calm. The professor waited till the sound had ceased, fanned away the smoke with his lecture notes, and began again: "And now we come to the bombardment of Constantinople." And a series of explosions occurred as before. Again the professor waited and fanned the smoke away; then he finished his lecture. After a careful study of the mechanism that had twice stopped his flow of eloquence, he went to the President's office and told the story to Mr. White, and suggested, it is told, that the perpetrators of such an outrage ought to be expelled. Mr. White sat thoughtful for a while, and then said: "That must have been a very ingenious device!" And so the matter ended.

The preliminaries of this affair may now be told. The idea doubtless originated in the fertile brain of Gus Parke, and when it was explained, someone suggested that President White lectured in the same room the hour preceding the lecture of the professor of history, and of course no one wished to interrupt "Prexy." Then it was remembered

that the President always lectured standing, while the professor of history sat with his feet under the desk. So it was contrived by Walter Kerr, that the professor, in stretching out his legs, should break a string and thereby release a mechanism that would guide a match over a sheet of sand paper to the fuse of the fire-crackers. Two packs were to be joined by a rather long fuse to insure the interval between the two explosive series. The scheme was so ingeniously conceived and so carefully executed, with a complete rehearsal the night before, that the highest hopes of the schemers were fulfilled. The coincidence of the lecturer's statement about the bombardment of Constantinople and the explosions was, of course, purely accidental; but surely the gods of chance and of laughter were never more propitious!

Another story is still told of a hoax planned and executed about this time by Walter Kerr and his ingenious friends. It was a time of great interest in spiritualism and spiritualistic seances were frequently given by so-called mediums. Even certain members of the faculty were fain to lift the veil that hides the Elysian Fields and adjacent territory.

Once a number of eager and credulous people were asked to attend a seance at the Psi U. Chapter House. In preparation for this call upon the spirits of the departed, a piano was conveniently placed so that wires attached to certain keys could be carried through the floor and over pulleys to an adjoining room where they were under the control of Gus Parke, who was an accomplished musician.

The audience assembled in a dim light, and the medium, in a trance, standing at the piano with hands high above the keyboard, moved his fingers playerwise, and lo, the

piano responded! Many of the audience went away wondering, and never really knew what happened.

Walter Kerr was a strong and enthusiastic football player. Football in those days was a very different game from that of today. The old game could be played almost anywhere in an open space; preferably where certain trees grew conveniently to serve as goal posts. Almost any number of men could take part, and at Cornell in the Seventies the game often became a strenuous contest between classes, with every able-bodied member of both classes playing; a few more or less on either side was unimportant. Few were ever trained for this game; anyone could just take off his coat and pitch in. A spherical ball made of reinforced rubber was used. This ball received such rough treatment that it became flabby often during the game. At such times the referee would call "Time" and take a small threaded brass tube out of his pocket, and surrounded by the panting, perspiring mob, would screw the tube into the valve-opening in the ball and blow into it with all the strength of his lungs. Then he would put the reinvigorated ball into play again and the game would go on. Often the ball came to earth under a squirming, struggling heap of breathless boys, and then there was the unpiling process and the referee's decision as to what should be done next, and again the game went on.

It was just the kind of a game for strong, healthy boys who, in the first frosty days of fall feel the irresistible urge to do something violent in struggles with their kind. It was just the kind of a game for young Walter Kerr; and often he kicked and ran and struggled manfully for his own joy and for the honor of his class.

Walter was also an enthusiast for baseball as it was played in those days, and was one of the catchers of the University team. It was before the introduction of modern baseball gloves, and catching the ball, which was as hard as those of the present, involved the endurance of quite severe pain. He used to wear a large kid glove into which he stuffed cotton to mitigate the suffering. Unfortunately the little finger of his left hand was broken and deformed in this sport, and he was unable to continue violin playing which he began as a boy. This was a lifelong regret, for he loved music; and whenever his violin came out of storage, he would look at it with regretful longing.

As a student, Walter Kerr took a helpful and leading part in many activities that had no direct relation to the work leading to the degree in engineering; but he never allowed anything to interfere with study for which primarily he had come to Cornell. His scholastic record was high and in addition to the required work of his course, he took courses in pure science, like botany; for even then biology, and also inorganic science, like crystallography, interested him deeply.

That his record for character and scholarship had been firmly established during his undergraduate years was shown by his appointment as an instructor in Sibley College upon graduation; his success as a teacher was confirmed by his appointment as assistant professor, the youngest professor Cornell had ever had, the following year. This position he held for two years.

Andrew D. White, writing in 1912, said of Walter Kerr as a student and teacher: "As to his life at the University, nothing could be better. He took hold of his studies with

remarkable vigor and success, with the result that upon graduation he was appointed to an instructorship in Sibley College of Mechanical Engineering and soon became one of the foremost men in that and kindred departments of the University. Whatever he did was greatly to the purpose, whether in study, in teaching, in fraternity matters, or in the general activities of the students."

Professor John E. Sweet, writing in 1912, said of Walter Kerr: "Our relations while at Cornell, where we first met, were not as professor and student, but as two congenial spirits working together. He required no stimulus except the desire to see things done; and though the things we worked on there were small, his ability to accomplish increased with his years and the demands of the times as is shown by a statement he made to me not long before his death, that he, with his organization, was doing a million dollars' worth of work a month for one client."

Those who were associated with Walter Kerr during his teaching period testify to his ability and charming personality, to his tact and efficiency, to his popularity with students and faculty, to his painstaking thoroughness in his work, and to his attitude of kindly helpfulness toward his students, who loved him because of his sympathetic interest in them.

But life in the calm of academic shades lacked the zest that Walter Kerr's nature demanded; and after three years of teaching, he resigned and entered engineering practice. This was to the great regret of the President, the faculty, and the students. But despite his own regret at leaving his friends, the charming life at Ithaca, and the work in which he had proved himself effective, he must

have felt that he was born to greater deeds in the midst of more stirring surroundings.

That his going helped to bring to pass a dream of Andrew D. White is shown in a letter of September 14, 1900:

Let me say to you, without the slightest idea of flattery — I am too old for that — that when I drew the educational features of the Cornell charter, pressed it upon the Legislature, and at a later day presented the "Plan of Organization" to the trustees, the foremost idea in my mind was that the proposed institution should send out men, such as you have proved to be, into the country, to strengthen our great industries and open new paths for them. It is a great pleasure to me to see this and other dreams of mine more than realized.

In a letter written in 1905 Walter Kerr said:

Briefly stated, what I received at the University that did me the most good was the practical spirit of Cornell, which stood for doing things rather than for academic learning about things. I regard that spirit as of much more value to me than anything I learned.

CHAPTER IV

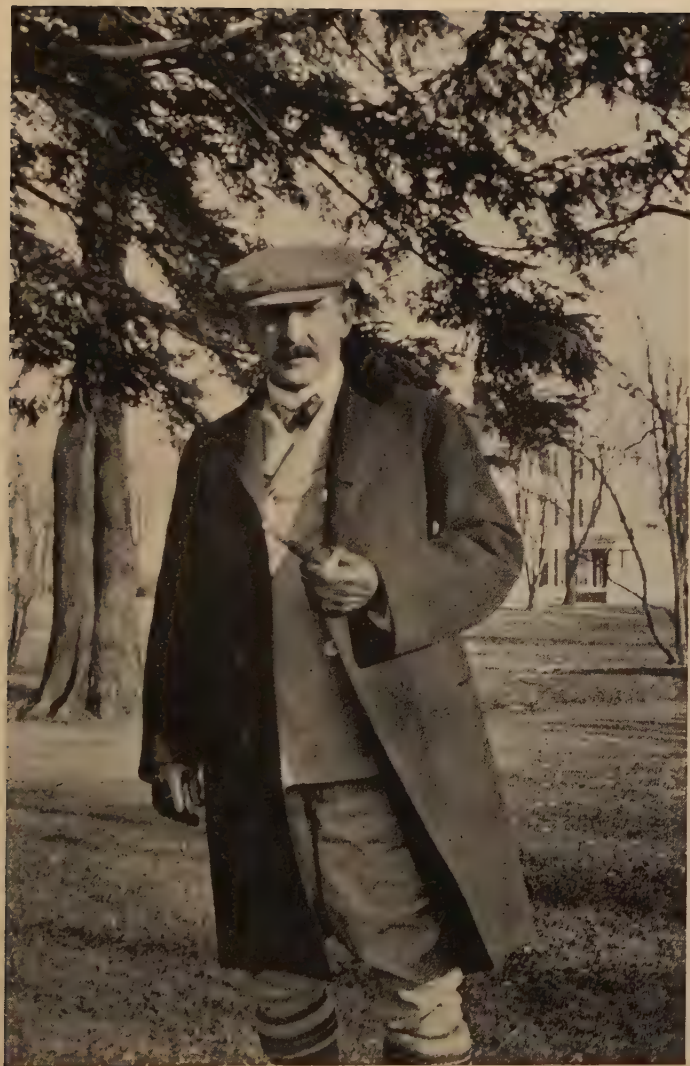
THE BURDEN AND HEAT OF THE DAY

WALTER KERR entered the field of engineering practice in 1882 when important changes were impending. Manufacturing was carried on then chiefly in small shops, and the building and equipping of such shops as well as other engineering properties were usually planned by the owners and executed by several more or less responsible and often antagonistic contractors, with consequent confusion and unsatisfactory results.

Electric generation and transmission were just emerging from the early experimental period. In electric-generating plants the high-speed, reciprocating steam engine, recently developed, was quite commonly used belted to generators of small size and high rotative speed. These engines were regarded with distrust by men accustomed to slow-running engines of the Corliss and similar types; but they had the advantage of corresponding more nearly in rate of rotation to the generators of the period.

About the time that Walter Kerr left Cornell the Westinghouse single-acting, high-speed engines were put upon the market. William Lee Church was agent for the sale of these engines, with an office in New York City.

The sales business developed rapidly and Mr. Church found pressing need for men who by reason of thorough technical training could present clearly the theoretical advantages of the Westinghouse engine, and who also



WALTER KERR
The Builder of Westinghouse, Church, Kerr & Company

could make the tests necessary to convince prospective customers of the validity of the manufacturer's claims. Men of that kind were harder to find then than now. Mr. Church advertised inconspicuously in the engineering journals, and out of the multitude of answers he winnowed two: those of Walter Kerr and I. H. Davis. These young men were called to his office, interviewed, and engaged. The choice was justified, for Mr. Davis served the Westinghouse interests for sixteen years, while Walter Kerr remained for the rest of his life. In those early years he proved not only the soundness of his technical training, but also showed that he possessed native capacity for wise and tactful conduct of business affairs. He often told Mr. Church that he was naturally more strongly inclined toward business than toward engineering. In other words he was born to be a man of affairs rather than for devotion to a single profession.

From 1882 to 1884 the Westinghouse Machine Company in Pittsburgh constructed engines and was responsible for all accounts, including expense chargeable against engines completed but not sold, while the New York office was merely a sales agency. This proved unsatisfactory commercially, and reorganization was deemed advisable by those who furnished the money for the enterprise. It was believed that if a selling organization with sufficient capital would undertake the disposal of the entire product of the Machine Company, paying for it in cash, an attractive price could be made to the selling organization by eliminating the hazard of bad accounts. Therefore the firm of Westinghouse, Church, Kerr and Company was organized on November 1, 1884.

Mr. H. H. Westinghouse wrote recently: "The policy of Westinghouse, Church, Kerr and Company in granting credit to customers was controlled by an enlightened self interest that was absent when the same individuals were hired employees of the Machine Company. Both in principle and practice the scheme was sound and the results were satisfactory."

"It was agreed in the contract," says Mr. Westinghouse further, "that the Machine Company would furnish a stock of engines and assume one half the carrying cost until they were sold. Just before closing the contract Mr. Baggaley, the representative of the Machine Company, asked Mr. Kerr how many engines he would need for stock. He named a number that he thought adequate. Mr. Baggaley said: 'You will remember, Mr. Kerr, that you pay one half the carrying charges of your stock until it is sold.' 'Yes,' said he, 'I do now, though I had forgotten; we will reduce the number one half.' Thus the cutting of eye-teeth began early."

Mr. Westinghouse continues: "The organization of Westinghouse, Church, Kerr and Company was completed in the Coleman House, an unpretentious hotel on Broadway near 28th Street. Church, Kerr, Davis and I were present. It was of course an interesting occasion to the four persons concerned, and there was a good deal of talk including many speculations as to the future. One room with two beds was sufficient accommodations for the members of the new firm. After the lights had been turned out and we should have been sleeping, Kerr shattered the silence by announcing that he would probably ultimately boss the new company as it had appropriated his initials.

We laughed and thought it a good joke, instead of a prophecy that was to be completely fulfilled."

In comparing Walter Kerr with an associate, Mr. Westinghouse says: "In the qualities of intelligence, industry, and persistence in effort toward the attainment of some desired end, they were much alike; but Kerr had the better disciplined mind which contributed greatly to his power for leadership."

A glimpse of Walter Kerr, in those early days of the new Company, comes from a record of memories made in October, 1925, after about forty years, by Charles S. Pease.

My first impression of Walter Kerr was a lasting one: He was a human dynamo! When he did anything it was done thoroughly and at high pressure. He attacked the morning mail "hammer and tongs" and cleaned it up so completely that not a scrap was left as a hold-over. A visitor was welcomed, his story was extracted, and he was sent on his way with no waste of time. A prospective customer saw immediately that he was dealing with a live man who knew his business, and he got the kind of attention that is so conducive to purchase.

I went to work for Westinghouse, Church, Kerr and Company in Pittsburgh in January, 1884, and was moved to the New York office in June following. I had been used for some years to the leisurely ways of the Engineer Corps of the United States Army and the hampering influence of much red tape. My arrival at 17 Cortlandt Street was timed so that I should report to Mr. Kerr about the close of the business day, to avoid interference with a busy man while he was signing his letters. I had intended to ask for an appointment "bright and early" the next morning to get a line on my job; but Mr. Kerr greeted me like a long lost brother, finished up his papers, whisked me off to the Astor House for dinner, and then back to the office where he pumped me full of his enthusiasm, ending about midnight. He saturated me with his ideals of practical engineering and

told me in detail of his ambitions for the Company. His insight and abounding energy were in the highest degree inspiring.

During my intimate association with him, extending over about four years, I never knew him to relax and "take it easy." If it was on a cat-boat on a Sunday afternoon on New York Bay, he sailed her for all she was worth. If we were short a fireman, as once happened at the electric plant we had installed at Trenton, he donned overalls and stoked the boilers skilfully till after midnight.

Mr. Kerr was appreciative of good work by his men, and was not backward in expressing his approval; this was one element of his power.

Mr. Kerr's energy always had direction. So many busy men become fussy and lose control of themselves and of their organization. Mr. Kerr used to say: "Now then, here are forty things to do; which is the most important? We'll do that first." That done, and the rest tackled without gloves in the order of importance, nothing was left to worry about.

The principal business of the new Company was the sale of Westinghouse engines of the single-acting, high-speed type, in sizes from 4 to 150 horsepower. But customers often asked advice about the other essential elements of the power plant: "What type of boiler is best under the circumstances?" "Should we use hand firing or mechanical stokers?" "Would a feed-water heater or a fuel economizer save operating expense?" "What should be the dimensions of the stack, and how about forced draft?" To answer such questions and many others, it became necessary to take on men with engineering training.

Moreover this was the time of isolated lighting plants, and many of the engines were sold for use in these plants; and so the market opened for electric generators, motors, lamps and auxiliary parts and fixtures. Then George

Westinghouse acquired the patents and services of William Stanley, Jr., and the Union Switch and Signal Company, one of the Westinghouse industries, began manufacturing self-regulating electric generators and incandescent lamps. The Union Switch and Signal Company had no suitable selling organization and no facilities for supplying auxiliary detail parts; and so Westinghouse, Church, Kerr and Company undertook to market the product and to furnish complementary parts. Under the leadership of Mr. Church, and the immediate direction of H. M. Byllesby, an experienced electrical engineer, Westinghouse, Church, Kerr and Company created an electric-lighting department and carried out its contract with the Union Switch and Signal Company, an arduous task in which Mr. Kerr took a prominent part. Their first work was in the equipment of isolated lighting plants; but the adventurous nature of Westinghouse, Church, Kerr and Company led them into the rapidly developing field of large central stations for generating electricity. Contracts were taken for several important installations including those at Trenton, N.J. and Schenectady, N.Y. This was a period of great activity and enthusiastic effort in which Mr. Kerr's dominant characteristics were clearly manifested.

Then the demand for auxiliary parts, required for complete equipment of electric-generating and -distributing plants, exceeded the market supply, and the Westinghouse Electric Company was organized in 1886 for the purpose of manufacturing a complete line of electric apparatus. The members of the Westinghouse, Church, Kerr and Company staff actively connected with its electric department were transferred to the Electric Company, with Mr. Church who

took charge of its selling organization. Mr. Church's transfer and the return of H. H. Westinghouse to the Air Brake Company, from which he had been temporarily detached, placed Mr. Kerr at the head of Westinghouse, Church, Kerr and Company, a position that he held until his death.

The formation of the Westinghouse Electric Company (which later became the Westinghouse Electric and Manufacturing Company) resulted in partial withdrawal of Westinghouse, Church, Kerr and Company from this specialized department, though they still handled a part of the electrical output. This reduced the volume of their business temporarily; but it also tended to guide them into an ever broadening field.

Meanwhile the Machine Company had developed a single-acting, compound engine of very original design which carried the range of capacity up to about 300 horsepower. Then, to meet the demand for engines of greater power for large central stations, they made designs for double-acting, slow-running engines of compound, two- and three-cylinder types which extended unit capacity to about 5000 horsepower. A number of these were built and put into successful operation. The excellence of design and construction is proved by the fact that, despite the competition of modern steam turbines, several of these engines are still in satisfactory service after nearly twenty-five years.

Meanwhile Mr. Church had reëntered the organization and had established a branch office in Boston. A method for refrigeration and ice-making had come to his attention which seemed to promise commercial success, and upon his

recommendation Westinghouse, Church, Kerr and Company undertook the necessary manufacturing and selling.

Also about this time the Company acquired the patents and business of the "Roney Mechanical Stoker" for boiler furnaces, and began its manufacture, development and sale. This was an element of power-station equipment that was connected fundamentally with economy of fuel; and at this time there was need for the application of trained intelligence to its development. It was, therefore, a problem especially attractive to Walter Kerr and his staff.

Thus the scope of activities of Westinghouse, Church, Kerr and Company increased and their clients multiplied. Within the Westinghouse interests alone they had command of favorable prices, expert advice and high quality of product in electrical machinery and auxiliaries, steam engines with widest range of capacity, mechanical stokers, refrigerating machinery, switch and signal systems, air brakes. Moreover, with the growing prestige of Westinghouse, Church, Kerr and Company came power for favorable negotiation with producers of all other elements of engineering properties. In other words, a great engineering organization was developing and fulfilling Mr. Kerr's growing ambition. He had believed for a long time that great engineering properties could be created most satisfactorily by one strong organization that became responsible for everything from the first sketches, through design and construction, and finally to the turning over of the finished product to the owners for operation.

Another man with faith in this centralization of authority was Charles P. Clark, President of the New York, New Haven, and Hartford Railway System. A new terminal sta-

tion was to be built and equipped in Boston, and Mr. Clark was experienced and wise enough to see that the diverse elements of the engineering equipment of the station were of necessity vitally interrelated; and he believed that the interests of the railroad would be served best if some organization should assume responsibility for the design, construction, and interrelation of the entire engineering equipment. So he sought for those best equipped for the work. He found that the Westinghouse interests were producing and installing more of the elements that were required than any one else, and he asked George Westinghouse to undertake the job.

Mr. Kerr had brought together a group of loyal and able helpers with varied ability and training; and, while carrying forward many smaller undertakings, was eagerly seeking a great opportunity like this, something bigger and more difficult than anyone had ever done. Here was his chance!

At the time of its construction the Boston South Station was probably the largest passenger station in the world. The engineering requirements included provision for supply of power, heat, and light; for ventilation, elevators, refrigeration, plumbing and drainage; for fire protection, switching and signalling, with the solution of all minor problems involved. The station necessarily extended over a large ground area, and there had to be provision against the rigors of a severe winter climate. Because of local conditions, the power and heating plant was at a distance from points of use of power, light and heat. The station site was within about 90 feet of tide water, with very open soil well filled with old docks and timber cribs, some portions of which extended to a depth of 8 feet below extreme low

water. These facts greatly increased the engineering difficulties. Also the peculiar shape of the buildings, due to the conditions of location, necessitated very large exposed surfaces in proportion to enclosed space, which complicated the heating problem.

A preliminary design of the mechanical equipment of the station, with complete specifications, was to be made and submitted to a board of trustees representing those responsible for the undertaking. Westinghouse, Church, Kerr and Company were given access to all information available, and full opportunity to determine all additional data required for the design, and were allowed to submit bids for the entire job before like privileges were granted to others. The trustees kept this agreement faithfully, despite urgent demands of many who wished to bid on the work in parts.

An engineering group of Westinghouse men undertook this work of preliminary design promptly. The first requisite was quick determination of the scope of the work, for the time was short and there could be no experimentation; everything must be finished the first time. Competent men were dispatched to make a study of the large railway terminals of the country to find out what plans and constructions had succeeded and what had failed. These men reported in Boston where their associates, meanwhile, had been considering general plans and making foundation drawings.

Ninety days afterward the design was finished. In addition to the design with all detail drawings and specifications, a monograph by a specialist was prepared on each important section of the work, giving methods selected and

data on which the design was based. Methods and apparatus considered and discarded were discussed, as well as those finally adopted. Complete estimates of costs were made and submitted with a proposal to construct the entire plant.

Mr. Kerr was chosen to present the complete scheme in the interests of the various Westinghouse organizations represented in the design. After the board of trustees, with authority to award the contract, had listened and approved, there was appointed a board of engineers consisting of the chief engineers and others in managerial capacities of the four tenant railroads, the resident engineer of the Boston Terminal, and Dr. E. D. Leavitt, a distinguished engineer of Cambridgeport, Massachusetts. This board considered the designs, specifications and monographs, together with alternate methods, and, after searching scrutiny, approved the whole scheme in substantially its original form.

Then negotiations turned to finances. To justify the acceptance of a single bid, the cost of corresponding work elsewhere had to be investigated and a demonstration made to show that the plant could be built for, and was worth, the price asked. It was shown that, as a result of single responsibility in design and construction, the Boston Terminal Company would save a very large amount over the fairly estimated aggregate cost with responsibility divided among several contractors. The work was then put finally in the hands of Westinghouse, Church, Kerr and Company.

The carrying out of such a great undertaking involved serious difficulties; but through them all the creating company moved steadily to successful completion. The qual-

ity of design and construction of the engineering work of the Boston South Station, and the success of the method of single responsibility, is shown most significantly by a record of the first operation of the entire plant. Usually the starting of a large, complicated system, with interdependent functions, brings great anxiety to those responsible for success, and local and temporary failures are not unexpected. This plant was put into operation in mid-winter; Boston immediately became snowbound with sub-zero temperature, and every operating function met emergency conditions. Day after day the service was maintained; nothing failed; not even a joint in the miles of piping of the heating system.

The engineering work of the Boston South Station was one of the earliest of the large undertakings providing for payments on a participating basis: the owners and the creating company shared equally in savings realized on a guaranteed maximum price. Thus the interests of the client became the interest of the engineers.

Consideration of this great work, with its complexities, with the variety of apparatus required and the number of organizations engaged in its execution, shows that its satisfactory completion was most highly creditable to all who were engaged in it, and, said Herman Westinghouse, "Mr. Kerr was the leading spirit throughout."

This job was a great achievement by an engineering pioneer, and its success affected the methods of all the most important subsequent engineering undertakings. Thus early — Walter Kerr was about forty years old at the time of the completion of the work — he had demonstrated the soundness of his judgment, the clearness of his

thinking, and his power for organization and expeditious accomplishment.

After the completion of the Boston South Station there came a period of rapid development of Westinghouse, Church, Kerr and Company; the organization found itself and began to feel its growing strength. The men found their places of greatest effectiveness, and the pace quickened. The resulting development was partly due to internal effort, and partly due to the demands of a changing world. Clients were found who wanted some one to do their work; they were not looking for advice as to what to do, but some one to do it. When this was understood a more versatile organization began to grow. Large undertakings were intrusted to the Company necessitating an increased force, until, in 1906, about four hundred were employed in the offices, and from two to seven thousand in the field. It was growth, not creation. Such an establishment cannot be built up quickly; it must grow, and growth requires time. The elements of the organization must work together for long periods to become trustworthy; men incapable of coöperative effort must be replaced; hence the very age of an organization is one element of its power and effectiveness for comprehensive work.

It is more difficult to define the former activities of Westinghouse, Church, Kerr and Company than of a company producing material apparatus. They did not produce things that could be called by definite names. They were organized to take care of their clients' needs whether those needs involved electrification of a railroad or the building of a complete hotel; the design and construction of a steel

structure, or the building of a school for girls; the production of a power house, or the designing of a large concrete cow-barn; the complete equipment of a railway terminal, or the creation of an industrial plant ready-to-run; the running of preliminary surveys for rights-of-way, or the making of engineering and statistical reports upon projects. The very essence of a competent organization is that it shall be able to do all things that need to be done. This is really simpler than to be constantly confronted by something it cannot do.

Since Westinghouse, Church, Kerr and Company did not make anything, they had none of the difficulties and embarrassments of the manufacturers of machinery. The finished product of machine builders was the raw material of the engineers, and it was made in fine quality and great abundance. The diligent effort of the Company's engineers was not applied to the production of apparatus, nor, primarily, to its selection — though that was of great importance — but to the correlation of many elements into a successful working plant, through proper designs, careful construction, and intelligent meeting of limitations imposed by surrounding conditions.

Under Walter Kerr's direction the Company was very particular about two things: the character of their clients, and the terms of their agreements. Engineering work often lasts through several years and the engineers are necessarily in intimate relationship with their clients; if the latter are narrow, contentious people, life becomes a burden to the engineers. Walter Kerr said: "We would rather die without them than live with them. So there is some work we don't care to undertake."

In dealing with clients the Company adopted a plan that was called "percentage engineering engagements." This plan was very different from "percentage contracting." The spirit of contracting is essentially selfish, though it may be legitimate. If payment to a contractor is a percentage of cost, he would not be interested in reducing cost; whereas if owner and contractor share in all savings, their interests become identical.

The motive of the plan of percentage engineering engagements, a motive that originated with Walter Kerr and permeated the entire organization, was: to accomplish every possible economy for the client. This was done in three ways: in design, in field management, and in purchase. Walter Kerr believed in the importance of all three, but considered that the greatest opportunity was in design; or, as he expressed it, "In the conception of the way of going at things." Large sums were often cut off with better results by change in design. He cited the case of a great engineering property that was completed by the Company at a certain cost, whereas another property for the same purpose with about half the capacity cost nearly three and a half times as much. This difference resulted from thoughtful attention to the original design. Such results can be attained only when the engineers have for their prime motive the interest of their clients.

Every element of the Westinghouse, Church, Kerr and Company organization was at service call to any job. Each job, or part of a job, was put in direct charge of some officer or employee of the Company who was always free to call for the attention of anyone from the president to the office boys.

The Company had certain limitations in its activities of which Mr. Kerr left a record. The chief limitation was human nature; there were the limitations of those with whom they had to deal; of those whom they could not control; their client's limitations became their limitations. The necessity to make money was a limitation, too. This required extreme care in making agreements to do work. The world is well supplied with those who are always trying to get something done for nothing; they had to be met and resisted; otherwise the Company would have been forced into unprofitable obligations.

If the engineering skill of a company saves a client a large amount — say \$100,000 — the client does not value it as highly as some material thing of much less value — say an engine or generator that costs \$20,000. Advice, design, or method that saves money for a client is not appreciated at its real value. This was a limitation.

Again there is the need for constant, untiring diligence in the prosecution of the work. A great mill or shop will grind at about its regular rate anyway; but in an engineering organization it is all man-work. If human effort is allowed to slow down it comes promptly to a standstill. Diligence has little time for diplomacy. If the engineer had time to look out of the window and to say pleasant things, there would be less hot telephoning and telegraphing; he must consider time all the time.

Probably the greatest undertaking of Westinghouse, Church, Kerr and Company was the work on the great Terminal of the Pennsylvania Railroad at Thirty-second Street in New York City. This included all engineering except the design and construction of the tunnels under the

Hudson River, which were in charge of a special board of engineers. Westinghouse, Church, Kerr and Company were made engineers for the mechanical and electrical part of the undertaking, including all service work and a certain part of the electrification of the Long Island Railroad. In addition to this the architects of the station retained Westinghouse, Church, Kerr and Company to design the steel structure of the building. The Company rendered engineering services for which the owners of this property paid a good many millions of dollars.

It is interesting to read the description of "Work Done" by the Company in its latter years. One wonders at the power and reach of a personality that could prepare to do so many diverse things that needed to be done. Walter Kerr not only did this, but he infused a new spirit into the creation of engineering properties, a spirit of coöperation instead of antagonism.

Walter Kerr was a great leader, but he was also a strong and loyal subordinate to a great leader. Once he was asked if he did not sometimes yearn to "set up shop" for himself: "No more," said he, "than the marshals of Napoleon. Why should I; why should any of us? Mr. Westinghouse is fair, liberal and just. He has the spirit of a great empire builder; he has supreme courage; he lacks entirely the conservatism that leads to content and dry rot. We are always doing something new; always going forward; we are never satisfied." Probably no higher tribute than this was ever paid to George Westinghouse.

There was another exceedingly potent influence that helped Walter Kerr toward professional success, the sympathetic understanding and effective support of Herman

Westinghouse. This man, whose life has been filled with distinguished achievements, wrote recently of his relations with Mr. Kerr:

"The intimate professional and personal relationship, which began with our first meeting and lasted through the lamentably brief remainder of his life, was, I have every reason to believe, a continuing source of mutual pleasure, respect and esteem. That this friendship was deep and sincere is shown by the fact that it withstood the many heavy stresses of a business association, filled with financial, engineering, and personal perplexities, without the passing of a single irritating word between us." Also he said with characteristic modesty: "I observed that Mr. Kerr esteemed chiefly men and women who possessed the finer human attributes, and I always thought better of myself because he at least seemed to find pleasure in his association with me."

After Walter Kerr's death, the Company continued its activities for several years, and was eventually absorbed by another company.¹

Developing the Westinghouse, Church, Kerr and Company organization and shaping its policies, with resulting commercial success and with salutary effect on the whole profession of engineering, was Walter Kerr's great life work. But he had also high ideals of civic duty, and his crowning work was the solving of the problem of the disposal of the railroad tracks at grade levels on the west side of New York City.

He became a director of the Merchants' Association of New York City about 1907. In 1912 a fellow director —

¹ Dwight P. Robinson & Co.

the late Henry R. Towne, former president of the Yale and Towne Manufacturing Company — wrote of Mr. Kerr: "I was impressed at once by his strong and attractive personality, his quick grasp of the many subjects which came before the board, his constructive mind and his faculty for clarifying every matter to which he gave serious consideration."

Later, as president of the Association, Mr. Towne asked Mr. Kerr to accept appointment to the Executive Committee. He hesitated for several days because of the serious demand this work would make on his time and because he knew that he could not render half-hearted service; but finally he yielded to the call of civic duty and accepted. "From that time until his final illness," wrote Mr. Towne, "he was an inspiring and vital force in the work of the Committee."

Mr. Towne also wrote:

Mr. Kerr was also chairman of other important committees of the Association, and in February, 1910 — three months before his death — he was elected one of its vice-presidents. Had he survived, it was the desire of many of his colleagues that he should become its president.

In many of his activities in the Merchants' Association Walter Kerr was greatly aided by his technical knowledge and experience as an engineer; and in all of this self-sacrificing work he was highly effective because of his general knowledge, his faculty for quick and accurate analysis, his ability to reach sound conclusions, and by the constructive quality of his ever active mind. The Association never had a more useful member. His work for it meant much sacrifice of time and convenience to the duty of giving to the community a service that money could not buy. This showed his unselfish devotion to the welfare of others.

In 1906 the operation in New York City over the West

Side freight tracks of the New York Central and Hudson River Railroad Company on the surfaces of Tenth and Eleventh Avenues and on West, Canal, Hudson and other streets had become a menace to the public, and the State Legislature enacted a law requiring the removal of these tracks from the street surface, but providing that they might be put in subways. Consideration of the subway solution showed it to be impracticable and, since no plan was agreed upon by the representatives of the city and the railroad within one year, the time limit set by the law, condemnation proceedings were begun.

Removal of the tracks and their terminal stations without provision in some way for equal freight-handling facilities would have imposed great hardship upon shippers, and the city's business interests required an effective solution of the problem. It was a problem of great difficulty and complexity involving many city and personal interests, and requiring tact, and knowledge of men as individuals and in groups, as well as a thorough understanding of engineering, municipal, and commercial affairs.

On November 18, 1907, the Board of Directors of the Merchants' Association of New York, at the suggestion of the Public Service Commission, appointed a committee with Mr. Kerr as chairman to consider this perplexing problem. The report of the committee, under the title: "Disposal of West Side Railroad Tracks," submitted after a study of the subject for more than a year was considered at a meeting of the Board on November 25, 1908 and adopted. The resolutions of adoption were in part as follows:

Resolved, That the report is hereby accepted by the Board of Directors of the Merchants' Association of New

York, as covering a definite and practicable plan for the solution of the problem to which the report relates, and that the report be duly presented to the Public Service Commission of the First District.

That in submitting this report to the said commission, in response to its suggestion, as a contribution by the Merchants' Association to the solution of the problems involved, attention is called to the definite and practicable character of the plan presented; to the progressive steps by which the plan can be inaugurated and carried forward, each step being comparatively independent, yet all being mutually interdependent when completed; and to the many subordinate and related problems which are to be solved by the adoption and carrying out of the complete plan.

Mr. William J. Matheson wrote under date of May 9, 1925:

Probably one of the most remarkable pieces of work that Mr. Kerr ever did was this plan for the solution of the West Side problem in New York. I was associated with him on the committee as business member, with Mr. Carrere as architect. The work and conception of the plan were all Walter Kerr's; in fact, when it was presented to me I was unable to make a single criticism or suggestion in addition to the plans made by him. The plans have been used and slightly modified, though not improved upon, by several Commissions since that time. I do not believe that Mr. Kerr ever got due recognition for his genius in devising the original scheme.

The date of the report is November 6, 1908. Walter Kerr was then fifty years old; therefore it was a product of his powers at their full development. He died a year and a half later.

Only a few know of this great work to which he applied all the powers of his rare heredity, his clear thought and trained imagination, and of his forceful character. Some

day this work will be completed, substantially as he conceived it; but the story of his part in it will not be on men's lips. This is unimportant, for if he had lived he would not have been troubled by lack of recognition; he would only have been dissatisfied if he had felt that he had failed to render his best service, or if it had not been carried to completion. His life-long enthusiasm was for accomplishment rather than for the praise of men.

CHAPTER V

FAMILY RELATIONS

WHEN Walter Kerr was a member of the faculty at Cornell, one of the most hospitable and charming homes in Ithaca was that of Judge Marcus Lyon. There were three daughters and two sons, who made their friends welcome and happy. Into this home Walter Kerr was introduced, and later he married the oldest daughter, Lucy, who throughout the years of his life presided graciously in their hospitable home. They had four children: Eleanor, Donald Craig, Marjory, and Phyllis Schuyler. Walter Kerr's relation with his family was characterized by tender affection and solicitude for their welfare, and by thoughtful and painstaking attention to the education of the children.

He was a lover of nature and he strove to arouse the children's interest in out-door things. When Eleanor and Donald were quite small, he used to take them into the woods and fields of Staten Island on Sundays when he went botanizing with William T. Davis, an eminent naturalist. These were joyful times for the two children for they shared the out-doors enthusiasm of the men and gained a love for the woods that they have never lost.

While at Wapasini Lodge — their summer home on Lake Placid in the Adirondacks — the whole family used often to tramp off together into the woods. On these excursions Walter talked to the children about the birds, flowers and trees in sight, and showed them fungi and other unusual things that nature brings forth in hidden

places in the deep woods. He also loved to prepare surprises for the children. These surprises were often fairy feasts that he had planned before starting. He would slip away unobserved, and returning would lead them on the pretext of showing them some rare plant, to a place where all at once they would come upon a fairy table of green moss trimmed with Indian pipes, wintergreen berries and flowers, and set with moosewood leaves for plates, and birch-bark cups filled with ginger ale. The food was usually chocolates or pink wintergreen candies that harmonized attractively in color with the green plates. Each of these surprises had some novel product of his fanciful imagination, and they were dear to the hearts of the children.

Marjory tells of those walks in the woods:

Father, in his enthusiasm for botany, gave us "flower talks" and always gave the Latin names first; even today I think of "*Daucas Carota*" rather than "Queen Anne's Lace." He carried a botany box for collecting, but we were not allowed to pick more flowers than were to be used. He encouraged us in pressing and mounting specimens. He was especially interested when we came to the real study of botany at school. He tried to overcome my fear of snakes, and explained about puff-adders in order to substitute interest for fear. His visits to Wapasini Lodge, sometimes unexpected, always brought us interest and pleasure; there were baskets of fruit, and his fun and jokes; there were parties and boat carnivals.

Marjory tells further:

I can never forget his generosity in meeting all of my wishes in the details of my education; his loving, helpful criticism when I made verses; his interest in the subjects that I studied, especially history and science; how he pulled out

books on prehistoric man from his shelves to show me; how he drew diagrams to explain to me how the moon caused the tides. Then there was his encouragement and help when I made designs for settings for the gems and beautiful stones that he furnished me.

I remember his exuberant joy when we returned from England; and how — because of his overwhelming love for us, and his wish to have us all happy and as free from care as possible — he went west to the hospital without a real, real Good-bye.

In general, my most outstanding memories of my father are his genial smile, his great willingness to help others, and his brave endurance of pain. Cheerfulness and keen humor shone in his face and twinkling eyes; and, though I can recall two or three severe and sorrowful talks on conduct when I was very small, I cannot remember my father as ever angry. We children were a little afraid of his strict justice and tried never to merit a "talk" from him.

His love and pride in our development just seemed to enfold us, and he asked for so little in return!

Several months before he died I sent him a little valentine with a quotation that he liked and spoke of over and over; it described perfectly his own unselfish love;

"Let me but have your love,
I'll bear your cares."

He never allowed the children to take an unnecessary risk. It was difficult to guard four healthy, active youngsters from all the dangers of the camp, the woods and the lake without limiting their enjoyment and checking their desirable development. His wisdom in meeting this situation may be shown by the instances that follow.

When Donald, at the age of ten, had become an expert swimmer, his father gave him a canoe and he was allowed to use it at his own discretion. But he was not allowed to swim far from shore unaccompanied by a boat. Every

newspaper article telling of the drowning of a powerful swimmer taken with cramps, was clipped and sent to him by his father as a warning. Donald also was given a rifle when he was twelve years old and instructed thoroughly in its care and use. But when he went with another boy to spend a night on the summit of a near-by mountain, and when his mother found out that the boys had taken Donald's rifle and a revolver belonging to his companion, and when they did not return promptly as expected, there was anxiety in the camp until they appeared. This episode stirred up discussion of the danger of trusting young boys with fire arms far away from camp. Mr. Kerr as arbiter promptly gave this decision: "The purpose of a rifle is to kill game; hence there is good reason for carrying it in the woods. Revolvers are made to kill men; therefore they have no use in peaceful woods." Thus wise compromise ended discussion.

As the children gained skill in swimming, paddling and sailing they discovered the pleasant thrill that came from upsetting boats and swimming ashore with their clothes on. This practice worried Mrs. Kerr, while the camp at large looked on with suppressed horror. Appeal was made to their father on his arrival from New York. He said: "The greatest danger in upsetting a boat is due to its unexpectedness; and, since all the children are fearless swimmers, and since also there are many good oarsmen and swimmers close at hand, there is little danger and great value in this new sport; in fact, the oftener they capsize the less the danger. But — it must not happen too far from shore, and there must be careful regard for their mother's convenience in furnishing outfits of dry clothing." He even suggested

to Donald that he and a friend go out in the sail boat in bathing suits, one at the tiller and the other at the sheet, and without prearrangement one should fall overboard leaving the other to manage the boat and effect a rescue. This was carried out many times with enthusiasm.

Mr. Kerr always carried a little "Safety First" kit when he was away from home with the children, so that if there was a prick or a scratch or an abrasion, an antiseptic dressing could be applied. "Perhaps no harm would result," he said, "but antiseptics is a good safe play."

Although he guarded the children from unnecessary risks, and although he gave them serious talks after accidents due to thoughtlessness, he was very fair in admitting his own lapses. One Sunday in the spring when the sun had softened the ground, Don took the girls' pony and went cross-country riding. While galloping across a field the pony, in a soft spot, went down on his neck, while Don shot over his head into soft mud. At home, safe but muddy, he told the story to his father, who said rather severely: "You didn't show very good sense! Don't you know better than to ride cross-country in the spring?"

That afternoon Mr. Kerr took the family in the automobile for a drive. To save distance, quite unnecessarily, he took a cut-off over a dirt road. The car went in up to the hubs, and it was necessary to call on a farmer with planks and a team to pull it out. When they got home Mr. Kerr said to Donald: "Well, perhaps I'd better not say anything more to you about lack of sense." Once when through carelessness he upset the boat in which he and Phyllis, then a very little girl, were sailing, he was most good natured when the older children in great glee lectured him.

On excursions with the children Mr. Kerr was always in holiday mood. He loved to play with them as a companion and teacher rather than as a dignified parent. Donald tells of his father in the most hilarious mood that he remembers:

I was a small boy, and Father took me out for a walk. Just across from the Richmond County Country Club a house was approaching completion. Father showed me through it and then said with shining eyes: "This is to be our home!" It was happy news to me, for we were living temporarily in a boarding house at the time. Then, in high spirits, we walked to a roadside tavern where we had luncheon. While we were waiting, Father wove several wooden toothpicks into a tiny raft and launched it in a glass of water. Then he doubled another toothpick into the semblance of a boy and set him on the raft. With a match, he lighted one of the projecting ends of the raft, and while it burned, recited: "The boy stood on the burning deck." Presently the fire released the bent elements of the raft and they recoiled, throwing the toothpick boy into the air whence he fell into the water and doubtless was drowned. In the face of this tragedy we bubbled over hilariously. I never saw Father laugh more heartily; we were just two small boys together.

When the children were all small and had gone to bed, he used oftentimes to lie down with them in the dark and sing rollicking songs, learned in college, and finally quieter ones till they were all fast asleep.

Once he took Donald, a boy of ten years, to luncheon at the Lawyer's Club, and seeing a man at another table who had recently climbed high mountains in South America, introduced Donald to him to stimulate his boyish hero-worship.

Eleanor tells a story of her father that illuminates a cor-

ner of his nature where humor and deviltry lurked together, well under control: "A very good man, Mr. A ——, had a cottage in the same camp with us at Lake Placid. He was a zealous, militant prohibitionist. One day when Father and I were in the village, his attention was caught by a large colorful Pabst Beer sign, hanging over the door to the bar of one of the hotels. As he looked at it, he chuckled and said: 'I think it would be good fun some dark night to come here, take that sign, and nail it over the front door of Mr. A ——'s cottage.'" Though he enjoyed the thought, he resisted the temptation.

Phyllis writes these memories.

I have two very distinct memories of experiences with my father that seem to me to indicate something of his nature, especially his attitude toward his children. These occurred when I was between eight and twelve years old.

It was Father's custom on Sundays to take his children for long walks, and it happened on one particular Sunday that I was the only one of the four children at home. So Father and I started out together gaily for the customary walk. The choice of route was mine, and I remember that we went over to the old iron works, up the golf course past the ninth hole, through the woods near Vanderbilt's Tomb, and out on the ridge overlooking the Moravian Cemetery. It was a clear October day, the air was keen and crisp, and as we went along Father talked about the trees that were about us; little interesting facts about their growth and peculiarities. He often used Latin names, which delighted me, adding mystery and making me think that my father must be a very learned man.

Every time a berry or nut caught my eye, I demanded: "Let me taste it; it must be good to eat." Father explained how some things that nature produced were good to eat and others were not. This made little impression on me, however, and he had to restrain me, gently but firmly, several

times. Finally a peculiar nut attracted my attention and Father said: "Well, go ahead and eat it; it is harmless." Childlike I chose the biggest one I could find and popped it into my mouth, expecting some very pleasant sensation. I chewed it; then I began to sputter and spit — for it was bitter, and it puckered my mouth almost beyond endurance. My sensations must have been expressed in my face for Father laughed long and heartily; but it was such a good-natured and kindly laugh that finally I had to join him. Then when he saw that the rancor was past, he chewed one of the nuts so that I could see the effect on his expression. After that we both felt better.

As a child I was very indifferent about learning to read; or in fact having anything to do with books; except that, in a lazy fashion, I liked to listen to reading aloud. But I did enjoy the library of our home. The room was not very large, and it faced west so that the late afternoon sunlight filtered through the bay windows and dancing bits of light were reflected from the brass desk set on Father's large table-desk. This desk occupied the center of the room, and there was a large samovar upon it that was suggestive of foreign wanderings. Pots of ferns and other green plants were always on the wide window sill; also a bowl of cracked nuts of which Father was especially fond. The fireplace was screened carefully and we children were instructed as to the danger of one single spark escaping. Father had designed the screen and had it constructed to prevent all fire risks.

The book shelves covered the walls well up toward the ceiling. They had fine carved borders, and the whole was stained a rich deep green. Some of the book spaces were high and some were low, to accommodate books of different sizes. These bookcases were made from Father's design. On the top there had been placed bowls and vases and candlesticks of brass or copper; boxes of odd shapes, carved trays, a mirror or two, and a few fine etchings and some enlarged photographs. There were easy chairs, a divan, hassocks, and a rug, all in harmonizing shades of green. I remember this room as having an atmosphere of ease and useableness, a delightful place to browse in.

In spite of my not caring to read, I did enjoy idling in this room, especially when Father was sitting at his big desk writing, looking through his microscope, doing exquisite initialing on cards, or designing jewelry. It fascinated me to watch him at work; he was so exact in whatever he did, so eminently neat and particular.

One day, when I was about eleven years old, while Father was busy at his desk, I wandered around the room looking at and fingering the books. Here were copies of the classics, there were bound magazines, with Philistines in neat piles; a corner was filled with poetry, a whole side wall with nature books; large volumes of "Gardens Old and New" lay on one spacious shelf. Suddenly I had a real desire to investigate the contents, to read something.

I asked Father what I should read. He glanced up from his work rather surprised, looked at me intently, got up from his chair and came over to me. "You want to read?" he asked in a casual voice. "Well, let's see; you have been looking at these books a good while; what do you think you might like?" I selected a large volume on, I believe, polarization of light. He chuckled a bit but said: "All right, I hardly believe you will find it interesting, but look it over carefully and tell me what you think." It was like the bitter nut; he wanted me to find out for myself. It is needless to say that I did not stay long with that book. Then he said: "Try one of my selection." I did, but did not care for it. Then we went from book to book for a long time, Father letting me make choices, never forcing the issue, never impatient with my erratic selection. At last we discovered something that I did enjoy; and this book we discussed both before and after I read it.

Books, from that time, became of real interest to me; and, added to the actual pleasure of reading, there was always a delightful feeling of exploration and criticism, for which I have to thank my Father's understanding and wise attitude at a crucial time.

Many people are shy about speaking of the gentler emotions that are stirred by human relations of the family and

of friendship, but who express their affectionate natures in letters and thus reveal hidden corners of their hearts. Walter Kerr wrote letters to members of his family, when he was separated from them, that show qualities unsuspected by those who met him in the struggle of the day's work.

His letters to his children were often illustrated with whimsical drawings and colored illuminated capital letters of his own design. He also wrote clever, amusing verses with illustrations. These letters always showed deep interest in whatever they were doing and thinking, and were full of expressions of affection.

On February 23, 1910, before starting for the hospital, he wrote from his office in New York:

Dearest Marge:

Thank you for your lovely valentine. It was such a dear, sweet collection of sentiments that I am much touched, and have read it over and over. Your whole letter was charming and full of the joyous life with which I am so glad you are blessed.

I have just returned from a three days' trip to Ithaca where I saw Don, and Eleanor who is visiting there on her way home from Cleveland. At the Psi U. House I caught the echo of your Junior Week, with many complimentary remarks regarding you and Mother.

Well, my dear, sweet, competent daughter, good-bye for a little while, and then I will try to write you more of my love and affection.

Later he wrote one of the girls from the hospital in Rochester a month before he died:

You dear little sweetheart Daughter:

Your spring letter with its lovely flowers wafted in the other morning and made it seem so appropriate that your

birthday should be in the spring. Your descriptions of what you dreamed and thought and did are all interesting. The valentine is still in my inner left-hand coat pocket where it has rested since it came — except when I took it out to read again.

Again the skies have cleared and the sun has appeared bringing a fair return to spring weather after the snow of last week. If it grows warmer I will be able to get out again for the nice walks that I have missed for some time.

It was sweet of you, dearie, to wish my pains all gone; but they will not go so easily. They linger yet; but with my improving strength and general condition, I hope to wear them away soon.

May all be bright and joyous with you, my precious one; and may the weeks as they go, bring you happiness and content, as well as knowledge and accomplishment. Mother joins me in sweet love to you.

Eighteen days before his death he wrote to Donald:

Ever since the receipt of your fine letter I have been trying to write to you, but many things have prevented. I have written but little and mostly in short spells with periods of great weakness between.

In spite of this he wrote four full pages, in which he gave Donald wise detailed advice about some of his important life problems that were then pressing. He told, too, how the operation had developed a much more serious condition than had been expected; how his pulling through had been due to his being in such competent hands, and to his good physical condition and his strong heart action.

This letter, written by sheer will power in the midst of weakness and pain, shows the temper of this man. As long as he was alive he would fail in no duty.

CHAPTER VI

WALTER KERR'S RELATION TO EDUCATION

THROUGHOUT life Walter Kerr was vitally interested in education. His boyhood home was pervaded by an atmosphere of culture. His father and mother were scholarly by inclination, and they had received the best available mental training of their time. The schools of St. Peter were good, and the records show that Walter took full advantage of all that they offered, even leading the teachers in scientific subjects. At Cornell he did all the work offered in engineering at the time, and also elected courses in biology and mineralogy. He became a successful teacher of engineering for three years after graduation, and could have continued a member of the faculty of Cornell. But though he chose the more active field of practical engineering, his interest in education never waned. He was always a teacher, helping the young men in the organization of which he was a leader, to develop their native gifts fully. He was a trustee of Cornell and of Staten Island Academy and he gave many public addresses setting forth his views on education.

In 1884 — about two years after Walter Kerr's resignation of his professorship — it became desirable to reorganize Sibley College in order that the teaching of engineering at Cornell might keep up with the rapid advance of engineering practice. President White and the Cornell trustees sought diligently for the man best fitted to undertake this development as director of the College. Throughout this

quest Walter Kerr was confidential adviser in frequent correspondence with the President. He investigated the fitness of many candidates, and made full and careful reports, rendering judgment on the policy that would produce the highest efficiency in the work of the College. His advice certainly influenced the character of the reorganization and the wise decision to appoint Dr. Robert H. Thurston to the Directorship.

He also was called in as unofficial adviser by President Charles Kendall Adams — 1885–1892 — and by President Jacob Gould Schurman — 1892–1920. On June 19, 1895 he was elected a trustee of Cornell University by the associate alumni, for a term of five years. Then in 1900, 1904, and again in 1909 — less than a year before his death — he was reëlected by the board itself. These reëlections by his colleagues gave the strongest possible testimony to his usefulness in dealing with the problems of a university.

About 1904 Walter Kerr gave much serious thought to the tendency of schools of engineering to become too purely theoretical, and to lose touch with engineering practice. As a result of his thinking he evolved a plan which may be stated in his own words:

The plan consists of the appointment of two men to each of the more important professorships, so that they may alternate between the university and the practical engineering world, thus bringing technical instruction into close touch with the spirit of engineering as practiced. I think that this plan would create a new type of professor, a man of much broader experience; and it would gradually weed out the undesirable types. It would also reduce the tendency to over-academic methods, yet always with due regard to the

importance of academic work. It would raise the efficiency of technical instruction because it goes to the very root of present needs.

Engineering education is in no danger of suffering from lack of academic quality; it falls short in the teaching of methods of practical application, in giving understanding of unavoidable limitations, and in cultivating the insight which comes from contact with men and materials. These deficiencies can not be supplied by courses in which students work with their hands, but by knowledge, example and inspiration on the part of those who teach.

The theory of this plan is right; there are however some difficulties in the way of putting it into practice. Most men who have become eminently successful in practice could not be induced to go, aside from the question of income, from a field offering full scope to great originality and power for administration, to the relatively narrow field of technical teaching. Such men love the thrill of originating and materializing great ideas, like those of power development, or mechanical flight, or the applications of electrical energy. Such men are apt to enjoy the sense of power that comes from being the final reference in all matters involved in the activities of many thousands of men.

On the other hand there are men who love contemplation and the relatively mild chase for technical ideas whose capture helps the captains of industry to produce material things that mankind will pay for. There are others who love their fellowmen more than all power; whose life's delight comes from constant association with the picked young men of the universities; who rejoice in imparting technical knowledge for use, and in offering sympathy, spiritual understanding and help to those who are to shape the ways of the world of tomorrow.

Those of the former class would find academic halls too tame. Those of the latter class would be unhappy trying to wield thunderbolts. But since Walter Kerr's plan became known it has been much discussed; and technical teachers have come to feel that increase in their power as teachers depends on their keeping in touch with practice, especially on keeping pace with the rapid advances in their chosen fields. Thus, in long vacations and during leaves of absence, they go out to work in the great industrial world. Whether they return to teaching, bearing new ideas and fresh stimulus, depends upon the resultant of all the forces of opportunity and inclination that act upon them.

Thus Walter Kerr's spirit has prevailed; for there is a constant influence of modern engineering practice modifying the methods of modern technical schools.

In 1896 the question of establishing in Sibley College a department of railway mechanical engineering was discussed at Cornell. A full-size locomotive had recently been installed at Purdue University for purposes of instruction and research, and it was urged that Cornell should follow this example. President Schurman appealed to Walter Kerr for advice. He approved, in a letter, of the establishment of a department of railway mechanical engineering, to cover a hitherto neglected field; to raise the standard of technical training of the leading men in this branch of engineering, where custom had led hitherto to the employment of men whose training had not been adequate for their responsibilities.

He then discussed the question of a full-size test locomotive and reported against its purchase because of the large first cost, the difficulty of delivery and installation,

its rapid obsolescence, and the danger that it would absorb attention to the detriment of other equally important subjects of this division of engineering. His advice prevailed and the department was organized. About 1897 Cornell's growing need for light and power led to a proposal to develop a new water-power plant of adequate capacity in Fall Creek gorge adjacent to the campus. Trustees Washburn and Kerr made a careful study of the problem and submitted a preliminary report to the trustees on March 3, 1899. A more detailed study was made later and reported to the trustees by W. W. Churchill, mechanical engineer of Westinghouse, Church, Kerr and Co.; as a result the present successful plant was designed and constructed by this Company. Mr. Kerr, out of his loyalty to the University, gave careful personal thought and attention to this problem throughout the entire period of design and construction.

But his usefulness to Cornell was not confined to larger projects; for his judgment and advice were sought and given freely on all questions that came before the trustees.

In 1894 a man considerably beyond school and college age wrote Walter Kerr expressing a desire to gain a mechanical-engineering education. In the midst of absorbing work he wrote a long letter in answer showing results of careful and sustained thought. An abstract of a portion of this letter follows here:

A man of your age is usually considered too old to begin the study of engineering, especially when he can not leave business to attend a technical school. I do not agree with this conclusion. I believe that the difficulty of study as one grows older is much overestimated. Many men, after a few

evenings of reading, give up, saying that a man can not learn after school age. This is about as useful an experiment as that of the Indian who had heard that feathers made a soft bed and lay down upon one feather on a rock and was unconvinced. If a man seeks to improve his mind he should set out to make it a life's job; and, whether progress is slow or fast, be willing to take what he can get.

First there is need to get into the right mood and to form habits of sustained study. I speak from experience because for several years after I left college I dropped study because of absorption in business. But later I began to study again; not only reviewing work already done, but taking up new subjects. I was surprised, after a few years, to find how much I had accomplished. I had read several books on chemistry, others on botany, still others on advanced physics; I had studied carefully a large work on astronomy; I had made special study of polarization of light and of crystallography. I had also done extended work with the microscope in several scientific lines. All of this is entirely foreign to engineering and out of line of my previous training. The reason for this is that I like to get away from business and into other lines of thought for relaxation and recreation.

I believe that any intelligent man can take up the study of any chosen subject, at any age, if he will only go at it in the right way. If he reads dry books and tries to study, without interest, unfamiliar subjects, no amount of diligence will make up for the depressing effect of lack of interest. If, however, he accumulates books and papers, choosing according to his natural taste, and sets them up where he sees them often, he will be tempted to sample them. It is not necessary to read them all; but to have them within reach so that from time to time he will refer to them, read chapter headings, look at pictures, and occasionally read something that catches the eye, never reading anything that lacks interest. It will help also to take a few journals, to glance them over, reading things of real interest, skipping everything else, making no attempt to remember but letting memory be a function of interest. Then one should buy more books with growing pride in the collection and in one's familiarity with

at least a portion of the contents. One should get especially a bird's-eye view of principles involved rather than detailed knowledge which comes only from close, constant contact with specialties. Thus a man may go on amusing himself, never doing anything distasteful, and presently may find himself a student without knowing exactly how he became one.

I do not value the training that comes from books as highly as that which follows from experience and personal contact with able men; but the bookshelf has to be the center around which the other things revolve, and one should seek the acquaintance of those who are highly trained in his chosen subjects. Assortment of friends is desirable even as variety is pleasant in other things. If your subjects are in engineering, seek the friendship of men ranging from the old time rule-of-thumb mechanic to the boys fresh from college.

An engineer in the Westinghouse, Church, Kerr and Company organization wrote Walter Kerr in November, 1897, asking advice about the education of his son. Abstracts from the letter in reply follow here:

I think you have done wisely in putting your son promptly in the presence of things which seem most to his taste and I believe that a year will show in what direction his talents lead. The work of the first year in the Institute — which is about the same for all courses — is good education, regardless of the ultimate aim, and hence your son could follow his bent at the beginning of the second year. I think we are all apt to waste anxiety on the future of our children; about all we can do is to put them in contact with work for which they seem to show fitness, and then to observe results.

I have noticed that there is a marked distinction between real engineering talent and a mere amateur liking for machines as playthings. Some boys are so wholly absorbed in one line that there is no question about their talent; there are others who are versatile and able to do well in many lines. In the former case the choice is easy; in the latter case I doubt if any one can help the boy in making a choice.

I have one strong conviction on the subject of engineering education: that specialization should not begin too soon. I believe that there are but few kinds of engineering, the chief kinds being: civil engineering, which deals chiefly with statics, and mechanical engineering which deals chiefly with dynamics. I believe there is no such thing as a steam-engine engineer, a steam-pump engineer, a machine-tool engineer or an engineer of any of the other minor sub-divisions.

My judgment is, other things being equal, that it is best to give a boy of engineering tastes a sound engineering education, specializing according to preference in statics or dynamics, and then to let talents, tastes and opportunities shape his future.

On January 4, 1893, Walter Kerr was elected a trustee of Staten Island Academy, and William Winter, President of the Board of Trustees, assigned him to the committee on teachers and school books. Soon after this action the question of providing a new building for the Academy was taken up and a committee with Walter Kerr as chairman was appointed. For more than two years he gave of his best energies for the promotion of the welfare of this school. He helped in the revision of the curriculum, in the raising of funds for the new building, in the letting of contracts, and in many other details; in fact he placed at the disposal of the Academy all his powers derived from his exceptional business and educational experience.

In June, 1906, he delivered the commencement address to the graduating class of the Academy.¹

On December 29, 1905, Walter Kerr gave an address at a dinner of the alumni of the Massachusetts Institute of Technology. The subject assigned was: "The Future of the Institute."

¹ See Part II: "Knowledge and Action."

This address was epigrammatic throughout. Its spirit appears in abstracts given here:

The safest vision would show that the future of the Institute will not be anything like someone's prophecy.

Causes and events will determine its future which is now seen too dimly to be identified.

It has been said that the results of things follow not so much from their state as from their tendency; hence, if this Institute will keep its tendencies right, there need be no worry concerning its state at any time, not its goal.

A few self-evident facts may have a bearing upon its future:

It can not become perfect.

It can not advance faster than the arts to which it relates.

It can not advance materially faster than the general advance of education.

It can not accomplish more than lies within the capacity of its raw material.

It can not make an effective man out of a boy in four years.

It can not inspire in its students a spirit higher than that within its own halls.

While looking into the future it is not well to do too much looking backward.

The soul's best gifts are lost in the waste of a backward looking mind.

I assume that this institution exists for the purpose of training engineers — whether they are civil, mechanical, electrical, hydraulic, mining, or textile engineers; or, by the added grace of art, architects.

To this end, it must have the right kind of raw material, and must handle it properly.

We are getting too many kinds of engineers.

Systematic arrangement in education and in the departmental practice of engineering seems to be giving young men

the idea that the scope of their attainment is limited by the name that is given to the division of engineering into which their taste seems to lead them.

Thus they are led to specialize too young, and are apt to wander away from the opportunity to become all-around men.

Although a man need not spread himself thinly over a large field, there is no reason why any competent engineer should not have that versatility which enables him to perform any engineering function regardless of the name by which it happens to be called.

I believe that the Institute is fairly safe-guarded, but it is easy to relax, especially along the line of least resistance, which now seems to trend toward departmentalism.

The technical schools have the greatest power in teaching youth regarding the scope of engineering acquirements and practice, because they have the first chance to mould thought and to influence motives.

There is much educational theory which flies too high. There is too much weighing of one finely spun method against another, resulting in methods that are over-academic and which leave out of the reckoning some of the simple factors that are the essence of the problem.

The perfectionist has a hard time in this world; he meets continual disappointment.

That a man may be educated in engineering, he must be capable of becoming an engineer. Preparatory education will not make him capable, and entrance examinations can only partially test his capacity. They only measure that part of what has been poured into him that he can pour forth on demand. We need a new standard in our educational institutions which shall be a combination of entrance requirements, and some method of determining whether a young man is endowed with ability to do the work of the course he seeks to enter. This is not the time nor place to discuss how this shall be done; but that it can be done there is no doubt.

Perhaps such radical suggestions tend to destroy system;

but there are systems that need to be destroyed. There is no virtue in system of itself. It is only valuable when it is a good arrangement of worthy things. The virtue resides in the things systematized; and if they are wrong, no system can give them virtue.

The Institute is located so far to the east of the center of population that most of the applicants for admission have probably had advantage of the excellent schools of the East. But the Institute should not draw its students largely from its own locality. It needs the advantages that result from variation and the democracy following. This requires it to assemble its students from a wide range. It should avoid provincialism; and while enjoying the advantages, should stoutly resist the limitations of its environment. The Institute derives many advantages from its location and suffers some limitations. The advantages are: its surroundings of civilization; the products of genius in art, music, and literature. But these things do not enter largely into the making of a man or an engineer. His main characteristics are determined by that which is induced to come out of him. The less he is constrained by the environment of many things which he did not do, the more he is impelled to evolve that which he can do. Unrestricted environment is in the main better for the development of youth than the constriction of many so-called opportunities. There is, therefore, an extra burden upon an institution, located in the midst of dense population, to strive to develop its students from within, even as they would naturally develop in the freer environment beyond the artifice which the world has set up and called advantage.

There are few who doubt that the preponderance of physical and mental strength, the capacity for vigorous action, the steady resolute nerve that wins losing battles, comes in the main from the country and not from the city. Loch-invars come out of the West. This is a great country with a rapidly evolving people. The highest development has been reached in the eastern border; the most rapid rate of development is farther west.

The men who are doing most for the progress of this nation are developing far west of the Atlantic Coast, and eastern educational institutions, as time goes on, must reckon with this fact. There is a tendency to self-satisfaction in these institutions which, if cultivated, will make them losers in the friendly race that is being run.

But it is possible also for them to cultivate a broad democratic spirit through which they can become potent factors in the larger development. There is no inherent reason why an institution should be better in Boston than in Michigan, the Mississippi Valley, or California. There is likewise no reason why the Middle- and Far-West should eclipse the advantages of the eastern centers. My special plea is that the future of the Institute shall be measured by the length and breadth of the land; regarding it only as an incident that it happens to be in Boston.¹

Engineers must provide for the material development of this country, and they will need breadth of character and clearness of mental vision to enable them to go out from any educational center, into any part of this diversified country with power to solve whatever problems they may meet. They must be quick to apprehend differences; they must look beyond their home horizon.

I have seen New England engineers in the West measure everything by a New England rule, which was woefully inadequate. Men from New York go out into a developing country and use a Metropolitan rule. Men from Philadelphia undertake western enterprises with a Quaker rule. You can almost tell whence they come by the way they go at things. They had studied principles compressed into local lines of thought and had learned only to use them within limits fixed by the constraint of environment beyond which they could not expand. I believe therefore that this institution should teach technology for the conditions of the North American Continent, and not for New England.

It follows that a faculty should not be made up of men who are too similar. There needs to be a variation in type,

¹ The Massachusetts Institute of Technology was afterward moved to Cambridge.

temperament and experience in teachers to whom students look for example and guidance. Selection and continual rearrangement of a faculty is a difficult and delicate matter. I have sometimes thought that faculty characteristics partake too much of fixation of species. Harmony is too often a gentle name for apathy. It would be better for many professors personally, for their work, and for their students, if they were to shift a few times, in the course of their careers, from one institution to another; or from their academic duties to the world's work.

Notwithstanding all I have said, I am inclined to think that all our wisdom regarding the future may appear futile in the light of after events. I believe the future is safest when, instead of following a predetermined course, it is committed to those that dare to do right things regardless of precedent.

Walter Kerr was invited to address many school and college audiences and accepted whenever it was possible. Portions of some of his addresses are given in Part II. They give more fully his ideas and ideals of education.

He might have become president of one of the greatest of the technical schools; but again he preferred the more stirring and responsible life in practice, and he declined to become a candidate.

CHAPTER VII

YACHTING

IN his junior and senior years at Cornell, Walter Kerr roomed with William C. Brown of Ogdensburgh, who from early boyhood had been enthusiastically familiar with sail boats; from him Walter caught enthusiasm, and learned something of sailing on Cayuga Lake. Later when they lived together in New York they were members of the crew of the "Kathleen," a boat of the forty-foot class owned by William Whitlock. At one time when the crew of the "Kathleen" was a man short, Brown had recommended Walter for the place, feeling sure that his energy and intelligence would more than make up for his lack of experience as a sailor. He made good from the start.

The "Kathleen" started in 29 races, won 22 firsts, 5 seconds, once was fouled and disabled, once fouled another boat and was ruled out; she was never in the ruck. These races were sailed in New York Bay, at Newport, Boston and on Long Island Sound.

During the races in New York Bay, Walter noticed that the tide currents affected the speed of contesting boats and this question must have occurred to him and pressed for an answer: "Why not use tide currents, instead of opposing them in yacht racing?"

Then, most opportunely, in the winter of 1884-85, Congress made a special appropriation providing for a study of the tides and currents of New York Harbor and its approaches. Under the direction of the U.S. Coast and Geo-

detic Survey, in July, 1885, there were four small ships in New York Harbor and vicinity observing currents. One of these ships was in charge of E. E. Haskell,¹ a classmate of Walter Kerr at Cornell. In the winter of 1885 Mr. Haskell invented a "Direction Current Meter" which was tested and found successful in the summer of 1886. This meter gave the direction as well as the velocity of the current.

Then one day in June, 1885 — as if Fate had taken charge — Haskell and Kerr met on lower Broadway and exchanged ideas on tide currents and yacht racing. Afterward Walter visited Haskell's ship as often as his scant leisure permitted and they discussed the question: "How can the velocity and direction data of the harbor currents be made available for purposes of yacht racing?" Eventually Walter obtained copies of accurate charts of New York Harbor and Lower Bay and on them recorded all available data including the Government observations. A letter from Dean Haskell gives information as follows:

"The set of 20 charts gave a complete record of currents in the Bay for each lunar half hour. The first chart showed conditions at the time of high water at Sandy Hook, which occurred about seven hours after the moon's transit. The second chart gave the record a lunar half-hour later, and so on to the twenty-fifth." With a clock set at twelve at the time of high water at Sandy Hook, together with the set of charts, the speed and direction of current at any place were known. Use of this information in yacht races resulted in a seven days' wonder; for the yacht on which Walter Kerr sailed won so often. Then the secret was dis-

¹ Afterward — 1906-1921 — Dean of the College of Civil Engineering, Cornell University.

covered, and the wonder changed to admiration for this method of winning yacht races by using brain power to supplement the wind.

Walter and Will Brown were members of the Seawan-haka-Corinthian Yacht Club; and, when Walter's capacity for making plans and executing them with intelligence and vigor became known, he was appointed to the regatta committee. Then there was an immediate change. The first race afterward started exactly on time with only about a quarter of the boats at the line; the others came along as they could. At the next race and afterward all boats were at the starting line at the starting minute. Moreover, previously the turning buoy had been carelessly located, and the starting direction was indefinite; afterward the buoy was exactly on the compass course. Other details also received Walter's reforming attention, his reputation spread, and he was invited to join the New York Yacht Club and was appointed to the race committee.

Mr. H. de B. Parsons, a distinguished engineer, was a fellow member with Walter of the race committee of the New York Yacht Club. He wrote in a recent letter:

Mr. Kerr was made an acting member of the race committee in 1906, and a regular member in 1907; he held this position until his death. In the work of this committee his ability was most marked. When complicated questions of interpretation of sailing rules came up as a result of protests, he had ability to sift the matter into its simplest form by a mental process of elimination. Statements and facts not relevant were promptly discarded, and the question was left so bare and plain that even the contesting parties were satisfied. This gift is rare, and I have never met another man endowed with it to such a degree as Mr. Kerr.

He never lost his temper except under just provocation;

even then he was always fair to high and lowly alike. He was always busy, but never so busy as to neglect his appointments; he was a friend on whom one could rely; he was a man and a sportsman!

In 1909 the New York Yacht Club rendezvoused off Newport. A run had been planned from Vineyard Haven to Portland. The start was made at 10 A.M. August 10th. The race committee, including Walter Kerr, started the run from the Commodore's yacht, and then steamed on ahead around Cape Cod where they encountered heavy weather, which grew steadily worse as they ran up along the coast. They were gravely anxious concerning the safety of the racing yachts.

Upon arrival in Portland the committee went ashore and spent the night. The following morning they steamed out to the finish in very heavy weather and waited for the yachts to appear. At eight minutes after nine o'clock the "Elmina," schooner, class B, owned by F. F. Brewster, crossed the finish line. Other yachts appeared at intervals with the "Adventuress," a sloop yacht, coming in last. The committee waited at the finish until all boats had appeared or been reported safely in port; they were really on duty forty-two hours, much of the time in heavy weather. Ernest E. Lorillard, a fellow member of the committee, wrote recently: "We served together on the race committee of the New York Yacht Club from 1907 to 1910. During that time we were often subjected to considerable hardship and long hours; on one occasion we were on duty for forty-two hours. Under such conditions Mr. Kerr's sterling qualities showed to the greatest advantage."

When Mr. Kerr died, a member of the New York Yacht

Club said: "We do not know where to turn to find a man to replace him on the race committee."

In October, 1907, a letter from the secretary of the Club notified Walter of his appointment to a committee to consider a method of handicapping.

In the following December he was appointed to a committee authorized by this resolution: "That a committee of five be appointed by the Commodore with power to add to their number, to invite the Yacht Clubs of the Atlantic Coast to a conference to consider changes in the measurement and racing rules. . . ."

These are but two of many similar appointments. Whenever anything was to be done requiring vigor, judgment, and tact he was called on.

A quotation from one of his letters gives a glimpse of his yachting in the summer of 1889:

You are right in presuming that my nautical summer passed satisfactorily. It could not well have been otherwise on "Kathleen," when out of 21 starts she took eleven first prizes and five or six seconds. Our few defeats were mostly on time allowance. Though we sailed in all sorts of weather, from calm to storm, and often in heavy sea ways, we had the record for sailing what is generally called an over-rigged boat without carrying anything away.

In addition to racing I have done considerable cruising on the steam launch "Floss," both in these waters, and, late in October, making a run down the Chesapeake.

On July 10, 1889, he wrote in a private letter: "I will leave the City (New York) Friday evening and will be at Marblehead until the following Tuesday. I go there to sail in the Eastern Yacht Club regattas."

For many years an annual match for the Manhasset Bay

Cup was sailed under the auspices of the American Yacht Club. On these occasions, from 1903 till 1909, Walter Kerr upon invitation acted as judge, representing the Manhasset Bay Yacht Club. Many letters show the high esteem in which he was held in this difficult judicial capacity.

In July, 1909, he wrote to his daughter Marjory from Newport: "I have been a week on the water. Our race series has been rather uneventful, except that there has been continuous good sport, and we have led what might be called an extremely busy, idle life. The greatest excitement was the finish between 'Aurora' and 'Istalena' — evenly matched sloops of large size. They finished four seconds apart, after a race of forty-two miles around Block Island. One beat the other only by the distance from the bow to the mast."

For many years yachting served Walter Kerr as recreation; it combined exhilarating sport with opportunity for executive service. Sport for him could never be passive; for, whether he worked or played, it was with all his might. He once said to a friend: "I find that my work is so absorbing and so taxing that my recreation must be of a kind that takes me out of myself completely." Sailing, especially yacht racing, with its eager thrill of contest and its health-giving activity out-of-doors, afforded him the diversion needed, and doubtless added greatly to his native power for distinguished accomplishment.

CHAPTER VIII

NATURE AS AN AVOCATION

WALTER KERR's sister said of him: "Love of nature, which in later life contributed so much to his enjoyment, was a source of many of his boyhood pleasures."

His enthusiasm for nature study was also shown by his electing courses in botany and mineralogy outside of his engineering work at Cornell. He continued to follow this avocation after establishing his home on Staten Island. In November, 1891, the corresponding secretary of the Staten Island Association of Arts and Sciences wrote him that two distinguished scientists had spoken of his fitness for membership in the Association. He became a member in March following. He once said: "The first meeting that I attended is well impressed on my memory; the only other member present was the secretary."

This association, with only two members attending a regular meeting, was his opportunity. In November following he was elected president, and he held this office for eight years.

Mr. William T. Davis, an eminent naturalist, an intimate associate of Walter Kerr in his scientific excursions, wrote about him soon after his death: "He was a naturalist; he prepared a work of unusual value on the flora and fauna of Staten Island, from the earliest records and calculations, to the present time. As president of the Staten Island Association of Arts and Sciences, he did more than any

other one man to establish it on a firm and lasting basis in the beginning of its distinguished career."

In a letter inviting Mr. Kerr to speak at a dinner to celebrate the twenty-fifth anniversary of the founding of the Association, the secretary, Arthur Hollick, wrote to him: "You were responsible, more than anyone else, for giving the Association a new lease of life at its most critical period, and for starting it upon its way toward its present gratifying condition; therefore you are the logical speaker for the occasion."

In one of his presidential addresses he outlined the functions of the Association:

This Association has for its mission the recording and preserving of the evidence of what nature has bestowed on one small, but richly endowed island, favorably located for all that our ambitions could demand; except that it is eventually doomed, as a field for naturalists, by the destructive influences of civilization. This fate impends, not because civilization is necessarily a destroyer of nature, but rather because most men are as yet so ignorant, their appreciation of beauty is yet so undeveloped, their hands are yet so wanton, that they fail to preserve that which their best efforts cannot equal. Thus forest trees disappear, not in judicious moderation, but ruthlessly and totally. Native shrubs give way to picket fences, hills are levelled, and waste places are made of nature's gardens. The past and present promise only general devastation. When that shall be complete, and our fourteen hundred native plants shall have disappeared, some by cutting away, others because their habitat is no longer habitable, when birds have flown because they have nowhere to nest, and when our vistas have been robbed of all that gave them name, the mission of this Association will practically have ended. Its records may possess great value, its collections may be interesting and rare. It may, as an organization, long survive the disappearance of its opportunities; but its force should be diligently expended while nature is still with us.

Upon another public occasion he stated that the services of the Association were always freely offered for the investigation of all matters within its scope; and that it was desired that residents of Staten Island should bring to its attention anything of local scientific interest, such as injury to crops, gardens or trees, by animals, insects or fungi; the occurrence of rusts, smut, mildews, etc.; material found in excavations, such as clays or minerals; the appearance of animals or birds not known to be common; peculiar conditions of streams or ponds or of anything in them; in fact anything that might be considered of possible interest in nature.

During nine years, from 1892 to 1901, at meetings of the Association, Walter Kerr presented papers, addresses and notes that are printed in the transactions under thirty-three titles. A few of these titles are given here to show the wide range of his interests:

Tide Charts of New York Harbor.

Adventitious Budding of a Horse Chestnut.

Plant Intelligence.

Survival of Storm-Injured Leaves.

Notes on the Destructiveness of Wind and Rain Storms.

A Proposed County Park System.

The Sponge, "*Chalina Arbuscula*." A specimen was shown from the shore of Fort Wadsworth.

Buttressed Roots.

Limonite and Quartz from Todt Hill.

The Horse Chestnut Fungus, *Unicula Flexuosa*.

Experiments to Mitigate the Mosquito Nuisance.

A Deep Well in the Serpentine at Dongan Hills.

Bracts of the Pitch Pine — *Pinus Rigida*.

In all of his scientific work there is evidence of his trained powers of observation and of his enthusiasm for

anything new or unusual in nature, with an earnest desire to find out causes.

His son Donald remembers that, when they first moved into their new house at Dongan Hills, the pest of mosquitoes was almost unbearable. His father had mosquito nettings made for every bed. Then, with characteristic vigor he started in on a crusade of extermination. He interested Mr. Davis and Dr. Doty, who was then port health officer, stationed at Quarantine, and together they looked to the draining of swamps and stagnant pools, and, where draining was not feasible, filmed the water surfaces with kerosene oil. This work was very effective and mosquitoes became as rare as in other habitable places. Donald also tells of a time when his father and Mr. Davis haunted a certain locality for several days and nights in an effort to get a certain insect that they wished to study under the microscope.

On September 14, 1895, he reported to the Association his experience of an earthquake which occurred on the first of that month:

I was awakened by the shock, and instinctively grasping my watch, timed it at 6h., 12m., 56s. As my watch was 55 seconds fast on the previous day, I fixed the time as practically twelve minutes past six, A.M. Eastern time. The shocks succeeded each other rapidly during about fifteen seconds; and, while I did not count them, there were half a dozen or more. I received a distinct impression of the vibrations passing from a southerly to a northerly direction. This was corroborated by subsequent accounts from a wide area.

Thus his scientific nature sprang from sleep, full armed, into action to meet the occasion.

At the twenty-fifth anniversary of the Association, Walter Kerr, ex-president, gave an address. He began:

The most interesting historical fact connected with this Association is that it exists and that it is really alive. There is a fine distinction between "existing" and "living." Mummies exist, and there are associations organized for various purposes which still retain their form without life.

Many associations have histories that taper the wrong way. They start with the enthusiasm of the few, extend to the mediocrity of the many, and decline to the lethargy of the uninterested and the uninteresting.

He then gave a historical sketch of the Association and its founders. Continuing, he said:

When I was president I was asked repeatedly how we held together and how we could keep up the work, especially with what others in their wider fields regarded as our limited opportunities. The answer was that this Association is the real thing. It has done serious work of quality and has not cared for quantity. Everything has been done for the love of it, and men have tramped fields and found and discussed things in a true scientific spirit. We were in pleasant social relationship, and together we played what was really more than play.

Finally he said:

When all of the field work shall have been done, it will remain only to preserve and guard the records. There is room for at least twenty-five years more of endeavor, and I take pride in delivering to those who shall come after, the keeping of the records, the motives, and the sentiment of the past.

Mr. William T. Davis wrote in 1912:

My friendship with Mr. Kerr began through our mutual interest in natural history, and many were the walks we took afield. Once when he was tired out from overwork, he sat by

a haystack on the edge of the salt meadows and fell asleep. He told me frequently that these little rambles that we took together were very restful to him; they certainly were very helpful to me, for he always made interesting observations. One incident in my relation to Mr. Kerr lives strongly in my memory, and is characteristic of the way in which he would help a friend. In the fall of 1895 I was extremely ill. One physician was very dubious about my condition, and I was proportionately down-hearted. Along came Mr. Kerr and in his usual forceful way battered the statements of the physician with hopeful arguments, and, as a result, I felt much better. He also consulted a specialist in my behalf. Thus he gave, at a critical time, a favorable turn to my condition, for which I have always been grateful.

The Kerr family spent the summer of 1896 at Center Island, Oyster Bay, Long Island. Mr. Davis spent two days with them as their guest. In his notes of the visit he wrote:

With the exception of Saturday afternoon, when I went sailing with Mr. Kerr, we spent both days in rambling about the beach and identifying plants. On Sunday afternoon we called on a Mr. Reddy, a local naturalist, who lived several miles from Center Island. He worked as a gardener or at odd jobs, and in his leisure studied the geology and flora of his vicinity. We three took a walk, visited a swamp, and looked at the wayside plants. My meeting with this man, interested in the natural things about him, was a pleasant feature of my visit.

Miss Jean Lee Hunt tells this story:

Mr. Kerr often spoke with great earnestness of his efforts to lead his children to observe for themselves, and to form their own conclusions from what they themselves saw and heard. I remember his satisfaction when Donald was sent home from kindergarten for contradicting his teacher. She had told the class that turtles were like lobsters and crabs, having their bones on the outside of their bodies. Don

smiled and shook his head and said firmly but politely that she was mistaken. Offended at his contradicting her she sent him home to think about it. He explained to his father that he had once found a dead turtle in the woods with all his bones lying inside of his shell. He knew because he had seen them.

As he grew older Walter Kerr gave less and less time to nature study. This defection was not due to declining interest, but was because of the multiplying insistent demands of his profession. He loved Nature to the end.

CHAPTER IX

POETIC NATURE

ONE who was a schoolmate of Walter Kerr's when he was about fourteen years old said recently: "He had a taste for poetry even at that early age, and more than usual ability in expressing himself in verse form."

In a letter to a friend Walter wrote: "Sometimes, between times, when everything is still, far away from the world of action, one may fall into quiet moods when he thinks of things he seldom expresses." Out of these quiet intervals came the verses that he wrote: especially light and dainty verses to accompany presents or to bear greetings.

A friend, Mrs. Helen A. Spencer, who shared Walter Kerr's enthusiasm for poetic expression wrote recently:

During several of the years when I knew him I was writing for a New York paper, and his interest in my work was one of the inspirations through which I came to know a good deal of his own love of writing, especially his versifying. He had a keen appreciation of the sound and color of words, whether in prose or verse, and for forceful and stirring phrases. His published speeches are full of examples as are also the few verses he actually finished. "It is the essence of poetry," he said, "to express in few words what could not be as well said in a page of prose."

The technique of versification delighted him; "mental fancy work," he called it. Poe's "Essay on Poetics" and Hood's "Rhymester" were apt to be in his coat pocket, as were also the slim first books of verse by more or less unknown men; for it was the minor poets whom he enjoyed.

"The big boys hide the way they do it," he would explain, "but I can tell what the little chaps are up to."

Free verse had no charm for him. He delighted in exact and complicated rhythm, in graceful or unusual rhymes, as well as in compact and vivid expression. Clear thinking seemed as important to him in verse as in prose; any writing that was muddled, affected or sentimental always annoyed him.

Among his own verses is a sonnet full of colorful words and sonorous rhymes. He used on occasions to read it aloud and to demand from anyone who admired it, an explanation of its meaning. It was early in our acquaintance that I first heard it read. A kind of desperate honesty possessed me, and after several of those present had said the polite thing, I ventured to protest that I didn't understand it. I can see now the quizzical look with which he folded it and returned it to his pocket. Later when he saw me alone he shook hands with me and said: "Bully for you! It doesn't mean anything; it isn't intended to, it is just words." He chuckled wickedly as he said: "I've read it to a number of literary ladies who professed to find in it some mystical significance." I had passed a test and from then on our literary acquaintance flourished.

It was the structure of a poem much more than its content that interested Mr. Kerr. But there were a few poems that he loved especially for their spirit, and which I always associate with him: Andrew Lang's dedication in "Aucassin and Nicolette," a few of Laurence Hope's, and passages from Stephen Phillips. All of these had for their theme release from care and escape from sordidness and weariness into a golden land. It was primarily this escape that he found in the land of poetry.

A man with such manifold interests and such pressing responsibilities found, as might have been expected, but little time for actual composition. I know that he had sketched out several poems of a serious turn; he may never have begun them; he certainly never finished them. One I remember had to do with the old lighthouse in the Moravian Cemetery on Staten Island, with the idea of the dead calling to those in peril at sea.

Two poems — quoted here — may serve to show the quality of Walter Kerr's imagination. The first was playfully written for his children when they were small. The second was obviously inspired by his love of the sea.

NOTHING

A Nothing came from nowhere
And went no place one day;
And yet he went quite near enough
To hear the children say,

In answer to the questions
That sounded o'er the din:
"O nothing! only nothing!"
And guessed they must mean him.

He knew that he was Nothing
And so he didn't care
Just where he went nor what he did
Let it be dark or fair.

And no one ever cared for him,
Though he was well inclined,
He had no home nor anything
To satisfy his mind.

As Nothing came from nowhere,
And had no place to go,
He slept at night with all his might
'Neath a downy quilt of snow.

He saw the pictures children make
Called nothing when they're asked
To tell what they intend to draw
Howe'er the question's masked.

He wondered if he looked like all
The things that bear his name:

WALTER CRAIG KERR

If so he must be very queer
And never twice the same.

He sometimes thought that he was real
And shook himself to see;
Again he really seemed a thought
Called nothing frequently.

He often found himself to be
Something that children do
Who hide behind their Nothing friend
And say what isn't true.

Just once he dreamed he saw his face
And watched its changing air;
But when he looked into the glass
Lo, he saw nothing there.

He went to the photographer
Who showed him how to pose,
Asked him to smile, but on the plate
The face of Nothing 'rose.

His dearest friend was Busy Bee
Who kept an open flower
And daily to her company
Served honey every hour.

He also played with Katydid,
But scarce approved her song;
For those who didn't seemed to be
More often right than wrong.

He thought his friends might tell him how
He wasn't when he was:
And Katydid, as best she could,
While Busy Bee would buzz.

At last his brain the puzzle solved,
At which he long had guessed;
All other things were everything,
And he was all the rest.

THE WAVE

The leaping wave with its curling crest,
With its burden of spray and foam,
Breaks on the bar of the ocean's breast
No path to farther roam.
It needs no pilot with anxious eye,
No beacon-light near nor far,
No "helm to port," for the lead is high,
Nor, "steady as you are."

It comes from a land that no man knows.
It goes no man knows where.
It follows another as it flows
And another its wake will share.
From seaward as far as the eye may see,
A wrinkle of age on the deep,
Forever it rolls from weather to lee;
Time only its vigil may keep.

The wave of life with its wild unrest,
With its burden of joy and woe,
Breaks on the bar of the world, unblessed
By a sign of welcome or no.
From time unmeasured by God or man
Through time undimmed by sleep
Forever it rolls through endless span;
Who dareth its vigil to keep?

Walter Kerr's friend, Ernest E. Lorillard, entertained him at a beautiful southern plantation; and, as a result, Walter was inspired to write the words of a song which he called "Yemassee."

In a letter to Marjory in April, 1908, he writes:

You have heard of Yemassee! Well my friend (Mr. Lorillard) is so very fond of it and everything about it that I have tried to write a song which, touched a bit with my own imagination, I hope will express his sentiment. You may be surprised to learn that I have also composed music for the song, an air with a dreamy swing which goes quite well with the words, as you shall hear later. As I have made so many suggestions regarding your verses, you might take a hand on mine and see if you can trim them to advantage. I have no pride of authorship, so take any liberties you choose with my simple composition.

The song was published, and the title page reads: "Yemassee: An interpretation of the love of Elizabeth King Scriven and Ernest Edward Lorillard for their plantation Bindon."

But Walter was not content with mere publication. A friend, Mrs. James, sang the song and a Victor record was made of it. Then at a dinner at the Lorillards' it was arranged that, at a certain interval in the serving, the Victrola was started and the song filled the room.

The words of the song are:

YEMASSEE

Within the fold of flowing arms,
Where rivers wind unto the sea,
Repose untold the mystic charms
That ever dwell at Yemassee.
Beyond the gloom, beyond the care,
Where all the world is lost to me,
The jasmine bloom with fragrance rare
Entices back to Yemassee.

The mellow glow, the ebb and flow
That wake the spirit of the sea;

Magnolia shade, palmetto glade,
Are in my dreams of Yemassee.
The lowly pride of servitude,
Born of the bond yet in the free,
Reveals the tide of gratitude
That lingers still at Yemassee.

The mocking train, the marble hall,
The shallow world of fantasy!
My heart would fain renounce them all
To breathe the air of Yemassee.
A dreamy thought of spreading bough,
Where mosses droop from live oak tree,
With magic wrought impels me now
To wander back to Yemassee.

Then who would fain to seek aright
Will find the land of fancy-free,
The lost Cockaigne of pure delight
Within the vale of Yemassee.
The day is done, and heaven above
In silence reigns with thee and me;
Then one by one the dreams I love
Lead from the world to Yemassee.

In acknowledging the receipt of a copy of this song, Dr. Andrew D. White wrote: "I am exceedingly glad to find that you combine, with your other rare qualities, those of poet and musician. This I have never suspected until now and I rejoice at the discovery."

Walter was not a trained musician; he worked out the music of the song on the piano, using one finger, and Mrs. Kerr, a skilled pianist, wrote the music.

EPILOGUE

Walter Kerr lived with a deep and constant sense of the responsibility involved in the gift of life.

His effective thought was illumined by imagination and, on occasion, colored by emotion and humor.

His acts, following promptly upon sound judgment, almost always achieved success.

Though death came early, it found him brave and ready, with a brilliant record of work done.

PART II
IN WHICH WALTER KERR SPEAKS

PART II

IN WHICH WALTER KERR SPEAKS

WALTER KERR once wrote in a personal letter:

We all have ideals of what we would like to accomplish; yet the most that any man can do is merely to contribute a little toward desired ends; he cannot produce an overwhelming tide that will sweep things in accordance with his wishes.

I am not out of tune with anything, but I do not agree with the assumption that all the so-called development is progress. The over-refinement and over-systematizing of a world all full of a number of things seem to me to bring a train of consequences which makes for mediocrity.

What I want to see is a condition in which, while preserving all other good things, there is a greater dependence on the man element in performance, and less dependence upon methods, machines, and conventionalities.

Excerpt from a letter to an engineer friend:

You have a way of putting things that encourages a man to come out of his cage; we all have our mental cages where we usually hide to prevent others from misunderstanding our wanderings of mind and spirit. I have sometimes wondered whether it is better to repress one's thoughts, expressing them only in action, or to give them rein and to let others think what they may. The resistance and misapprehension of the world pushes in one direction, and the response of a temperament like yours pulls in the other.

I think more often than you know of the difficulties of your task. I only see dimly its constraining conditions, and have no magic wand to wave over them. It is so easy to do things that everybody agrees should be done, but it is so hard to do things that one believes ought to be done whether others believe in them or not.

I have had my share of this struggle in building up a type of engineering industry along new lines, with new forms, relationships, and organization, not very clearly apprehended by those outside the walls, frequently misunderstood, often misjudged, but in the main making some headway all of the time until a rather firm footing was reached, so that what had been gained could be held, so that more could be realized.

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Speaking of doing good things that nobody seems to want done, reminds me of an interesting chat I had with General Frederick D. Grant, next to whom I happened to be placed at a recent dinner. He told me many interesting things about his father; the most interesting of all was the story of how, many years ago, in Texas, when many detachments of troops were incapacitated by fever, he reasoned, through common sense instead of science, that the pest of mosquitoes caused the fever; so he screened his detachment so perfectly that his men were not only competent for action, but were able to care for others and to replace them on duty. This action was belittled by his associate officers, ridiculed by the men other than those benefited, and was criticised at Washington. The cost of the screening, about \$3000, was charged against him and his quartermaster, and he was reprimanded for unauthorized and unwarranted expenditure. But he fought it out with the facts and won his case. Now, after all these years the mosquito is known to be a carrier of fever infection. This was very interesting to me, not only with reference to the mosquito question, on which I did some of the early work, but as showing the particular kind of courage the great General Grant displayed beside military valor.

POST GRADUATE SUGGESTIONS

Address before Sibley College, May 11, 1905

By WALTER C. KERR, '79

IN general, one generation cannot teach the next how to do its engineering. The best it can do is to show how it applies fundamental principles and record the results which follow. In other words, the best which each generation can do, aside from passing along the fundamental knowledge that underlies all engineering, is to contribute its experience in the best form it can devise and let the next generation draw its own conclusions.

This has a bearing upon the way and the spirit in which engineering should be taught. There should be a continuity of application of principles and interpretation of results, rather than a crystallization of engineering data into conventional form with an attempt to establish fixed rules for future guidance. There should be no finalities, no rigid conclusions, no attempt to settle anything for all time, no unwarranted generalization, nor any of those things which tend to the restraint rather than the encouragement of variation.

We hear rather too much about standards; they are all right in their way if they do not tend to crystallize errors. Best methods are what we want. These can never become quite fixed, but must always be getting better in order to approach the best. They must be effective and efficient rather than old or new. Precedent has no inherent merit.

Times, conditions, and the arts change so rapidly that the presumption is against, rather than for the older methods. Do not get wrong views regarding what kind of an engineer you are. Specialization is a form of limitation, and only to be adopted when preceded by sufficient breadth. Some are born with limitations, and others acquire them. Any one can resist the tendency to serious limitation by apprehending it. You young men should be versatile; and if you can't be versatile, be as versatile as you can.

Learn to think quickly — to learn quickly. The process of cramming before examinations is often criticised; it should not be called a good practice as distinguished from steady application, but it has its uses, and the capacity for it serves many an emergency. Engineers must tackle emergencies and lawyers must prepare for urgent cases on the cramming system. Properly speaking, it is simply an intense application for a short time instead of moderate application for a long time. It is not necessary to forget what you learn quickly.

It is an unconscious habit of universities to regard time as unlimited and to tolerate its waste. It is a habit to measure effort by how tired one gets rather than by what is accomplished. Such habits are infectious. Speed and quality are not incompatible; quality accompanies speed when the essentials are regarded and the non-essentials eliminated.

A man should have reserve power to do more than his conventional duties, to double or treble his pace when necessary, but he should not waste energy trying to do it all the time. In large organizations men of fair attainments who have shown no surplus capacity are dropped to

make room for others who may be more available in time of emergency.

There is one department of training to which consideration is seldom given, and the importance of which I think is underestimated. It is the cultivation of the physical senses.

Professor Huxley once testified in court, as an expert witness, that it was his experience that only about one trained scientific man out of five was capable of witnessing an event and telling all he saw and nothing that he did not see, whereas for untrained men no ratio could be fixed.

We have no way readily to define the power of the senses, but it is well known that certain persons with defective sight so grossly fail to see the size, shape, and relative distances of objects as to fall constantly into error. That our sense powers are inferior to their possibilities is illustrated by the wonderful touch developed in the blind, and a relative measure may sometimes be obtained of this through persons who have become blind after sufficient years of sight to enable them to testify to the subsequent development of their other senses.

The marvelous sense development of Helen Keller is sufficient to indicate the degree to which we normally fail to utilize our potential powers.

In education much stress is laid upon cultivation of intellectual processes and little upon the training of the physical senses. The fact that they are necessarily so interdependent makes it often difficult to differentiate them.

The physical senses play an important part in the ac-

quirement, assimilation, and use of knowledge. There is a wide difference between men in the senses of sight, hearing, smelling, tasting, feeling, and orientation. The latter, being possibly unfamiliar to some, is the sense of direction or turning and resides in the coiled tube of the inner ear. Its functions have been well determined, but it is the sense of which we have the least apprehension.

In prehistoric times man doubtless had a low order of intellect, his actions and accomplishments being governed largely by the physical senses which, as in the case of animals, were perhaps very keen. We may even assume that his physical senses were highly developed and that he had power to use them to great advantage, as observed in our North American Indians. Early history, legendary lore, and mythology evidence vivid imagination. Early religion is almost fantastic in imaginary creation, indicating that through intellectual processes man even seemed to be more willing to believe what he imagined than what he saw and heard. One can detect the tendency of the intellect to distort the impressions made through the senses. Images were not often made to look like things which had been seen, but rather like things imagined, yet moulded in the forms of men and beasts. This play of the intellect later developed art, literature, mathematics, and philosophy, until at a certain ancient period of the world these flourished and became so competent that their results have since been scarcely excelled. Whether or not these intellectual developments had an adverse tendency on the physical senses may be difficult, and perhaps unnecessary, to determine. There is, however, some reason to believe that there was an actual deterioration of the senses, as may be perceived in

the fact that savage races have keener sight, smell and hearing than the civilized, and this may also be generally said of the lower classes of our day.

Centuries after intellectual development reached its highest state and long after intellectual attainments had time to mature and disperse throughout the civilized world, there swept upon us a flood of advancement in the sciences, improvement in the arts, and great additions to the world's material welfare. There seemed to be an awakening of effort of the kind in which the senses are closely concerned.

The part which the intellect played should not be minimized. It has been of the greatest importance. I only wish to make plain that the same intellect existed, its same high power was ever wielded, but it did not produce these results until the profound application of the power of the human senses aided it to the great things which have been achieved.

The development of the individual largely follows the laws of the evolution of its race. This has been demonstrated throughout the organic world. Similarly, the development of each man follows largely upon the course which has led to the evolution of the whole race to which he belongs. The evolution is beyond his control, the development is largely within him.

Any young person, therefore, who is yet shaping his course, gaining his knowledge, training his mind, exercising his senses, and fitting himself for life's work, has an opportunity which he should not lightly regard of doing whatever helps to shape his path to the most competent ends. How many have attempted to cultivate or even properly to care

for their senses. Our mode of life and personal habits tend to cause them to deteriorate.

There is too much belief that thought or intellect alone can produce results. There is a story told of the representatives of three nations who were required to write an essay on the camel. The Englishman proceeded to collect methodically all recorded knowledge; the Frenchman organized an expedition to study the animal in his native haunts; while it is related that the German shut himself in a room with pen and paper and proceeded to evolve the camel from his own inner consciousness.

In each person the senses are usually unequally developed. Few in these times have good eyesight; many are color blind. Hearing is comparatively defective. Taste and smell are probably very defective, but being of minor importance are very little noticed. Orientation is noticeably defective in many and in conjunction with hearing its imperfection is observed through the inability to tell the direction of a sound. Again it shows its imperfection as regards the points of the compass. I have often wondered whether deficiency in this sense was not at the root of the tendency shown in some to confusion under certain circumstances. It has been my observation, though limited, that those who have a high sense of orientation were peculiarly clear headed in other things than direction. So little is known of this sense and its relation to others that its consideration must be largely speculative. The point I wish to impress upon you is that your eyesight is of the utmost importance to your work. Preserve it. Train it. And by mental application try to correct it where it may be in error. Regard with alarm failure to see things correctly,

and through your mental capacity try to concentrate your optical powers to exact recognition of objects and their relation to each other. Don't be too sure that you see straight.

Note whether your hearing seems good, when and how it deceives you, and again by mental application try to concentrate your hearing capacity to the accurate recognition of things audible and a proper interpretation of them to your brain through this sense. Touch is perhaps the most neglected sense. We scarcely allow it an opportunity. Only the blind have made it useful.

I do not think it possible to determine always just what part of an operation we perform with our brain and what part follows from the use of the senses, but when I have seen comparatively ignorant men come upon the scene of more or less complicated work and by remarks and actions show that they instantly comprehend the situation, in fact so quickly that they are ready to act upon it in minutes or seconds, I cannot but feel that their power of absorbing information through their physical senses far exceeds what would usually be called their mental ability. Again, it may be noticed that those who are given to much study, to constant reflective thought, and who live far back in the inner recesses of their own minds, rarely are good observers and seldom comprehend the full significance of what they are in the presence of. Certain temperaments thus influenced are called dreamers, and I have wondered whether it is not due more or less to stupefying the senses by over-intellectuality. Chronic absent-mindedness seems to me a form of dulled senses.

The use of the senses may be practically observed where

a broken machine part is in question. One man glances at it and goes off to think about it. Another looks it over carefully, examines the fracture minutely, lifts it, feels it, rings it, and unconsciously uses his senses in a manner not easily defined. He is apt to get closer to the facts than he who looked and ran away.

I cannot prove much that I have said on this subject. I can only state the results of some thought and observation. Whatever may be the measure of correctness of what I have said, I am sure that some good and no harm will come from the apprehension of the value of the senses, their careful preservation and cultivation, and so interweaving their operations with the intellectual processes as to give them an equal opportunity for action in the conduct of the many practical affairs of life.

On the relation of capital and talent. The power of money is often misapprehended and undervalued. The power of money is real, while that of talent is potential. Money carries with its purchasing value the power of the effectiveness which earned it. Talent carries only a promise to earn to its best ability. Money is "a bird in hand." Talent is the "two in the bush." There are old sayings, such as "money talks" and "money makes the mare go," which are founded on this power, and are significant. The power of money may be dictatorial, and it has a certain right to be. It has the power of might, because it has complete option of what it shall do. Talent has less option — it is usually a thing to be hired and paid for with money. Money is decisive. Talent is advisory.

All things are apt to be misjudged and the power of

money is too often criticized as domineering over talent and the ability of mankind to perform. It should be especially remembered that money in a certain sense includes talent, because it is able to purchase it more readily than talent can acquire money. As a rule the investment of large capital in any enterprise involves the appropriation within a short time of large amounts of capital variously earned through long time by talent of diverse kinds. Such funds, therefore, represent the accumulation of the proceeds of talent, labor, and successful enterprise in a way to warrant the added importance of capital beyond its mere purchasing power.

It is often charged that capital absorbs too large a share of profit, that it has too much control, that it is ungenerous. While individuals may have these characteristics, capital in general does not exert more of these attributes than is necessary for its own protection. I think, however, it may be properly charged that those representing capital ignorantly fail to spend as much as is judicious in the employment of talent in the early stages of undertakings, to determine correctly how the capital shall be best expended.

When one surveys the risk at which capital is placed in business, manufacturing, transportation, and all of the larger physical operations which mark the progress of civilization; when one sees the pitfalls that lie before it, the accidents and mishaps for which it must pay, it is not strange that it needs to hold control and to make assurance doubly sure in order even reasonably to avert the many things which menace it. Talent, on the other hand, has no such vested interest to protect and must always take

the secondary place in the administration of the things which its activities create. Capital, therefore, uses talent but will not relinquish the reins to it.

Engineering and construction. Engineering begins with contemplation and ends with operation. Between are various steps: design, plan, specification, and construction. A conventional line has long been drawn between specification and construction at which the engineer stopped and the contractor began. This practice has been so long followed as to be considered fixed and, therefore, right. Such division has sometimes been referred to as a natural one — it being the point at which effort is supposed to turn from mental to physical. Such reasoning is in error.

Engineering should fulfill its ultimate destiny and not stop at any arbitrary point fixed by custom, prior practice, or based on prior limitations. Engineering service should begin at the beginning of a problem and end only at the end. There is no natural place at which to stop it, or to exchange it for an inferior method. The essence of engineering is construction and all contemplation, plans, and specifications lead to this goal.

When engineering has performed the functions of contemplation, specification, and design, some are inclined to think that its mission is ended, and that the doing of the work in accordance with the plans is a simple operation to be let to the lowest bidder. This is an underestimate of the responsibilities and inherent functions of construction.

If by construction we mean the building of machines in organized manufacturing establishments, the process of construction, following upon design and specification, is

somewhat simplified by manufacturing facilities even though the operations performed are complex. The responsibilities and methods involved in the manufacturing arts form a chapter by themselves, and it is not of these I specially care to treat at this time.

I have in mind rather the type of construction which produces properties; which deals with field work, the assembling of manufactured products, the erection of structures, and the adaptation of multifarious things to an end, whether that be a railway, an industrial works, a water-power development, or other engineering undertaking.

It would be quite impossible in one short address to give an adequate idea of all the things which enter into the successful conduct of engineering principle and effort in a finished property.

There are, however, two methods of procedure which differ widely in theory and results. One may be termed contracting and the other engineering construction. Contracting is essentially a selfish operation. The contractor, broadly, feels no obligation beyond complying with the prescribed duties. It is not feasible to prescribe fully any man's duty by plan and specification, and it is still more difficult to enforce it.

Engineering construction, on the other hand, involves essentially an unselfish motive. It aims to carry on construction in the spirit of engineering, in which the client's interests are constantly safeguarded. Engineering construction thus conducted requires that the engineering organization be provided with most of the facilities which ordinarily attend contracting, which facilities are used to produce work at the lowest first cost, the engineer being

compensated in the form of a percentage on the total cost, estimated cost, or an agreed net sum which is more or less proportional to but does not vary with the cost.

There are certain classes of work more susceptible to this form of engineering construction, while others are particularly well fitted for contracting. There is room in this big world for all kinds of men and all good methods.

Contracting is especially suited to the performance of that class of work in which designing and constructive talent differ widely, as in many classes of architecture. Certain gross civil-engineering operations, such as embankments, heavy masonry, hydraulic improvement, etc., require one kind of skill to plan and a different activity to execute.

In mechanical, electrical, and other forms of engineering requiring many refined operations, there is little difference between the type of engineer who plans and the one who constructs. Thus it is that engineering construction has begun to supplant largely contracting in such work.

Again, where the problem is not essentially the performance of civil, mechanical, electrical engineering, or architecture, but is rather a problem of the creation of an entire property, including all these and many other forms of engineering construction, the further condition results in which the process of contracting becomes exceedingly complicated, chiefly for the reason that there are no contractors competent to take on such widely various work. It is necessary to split the work into numerous contracts, which is in many cases uneconomical and difficult to administer, involving division of responsibility, and certain incompleteness resulting from the practical impossibility of making

many unlike things properly join when separately produced. Thus the day has come when engineering construction, carrying the engineering spirit from design through to constructive completeness, is found well adapted to the creation of modern extensive properties, most of which are very complex in character.

An obvious gain results from bringing the designer in close contact with the construction operation, thereby enlarging his knowledge of limitations; on the other hand, the constructor learns how to carry on the work better through more intimate contact with the design.

This beneficial influence following the mutual contact of designer and constructor may be experienced individually, through organization methods, even if the individual is not personally alternating between design and construction.

Organization methods are often too crude. A lot of good men do not make a good organization unless they are temperamentally suited to each other and to team work.

Organization takes time, and it is an error to believe that it can quickly become effective. All facilities in organization should serve work by the most direct channels. Graphically speaking, it may be said that service facilities should operate radially to the center, going straight for the mark, and not involve circumlocution through the often too complex lines of administration. Too much administration results in red tape and cumbersome departmental methods.

On the whole it is easier to perform the pure engineering of design and specification than the operation of successful and economical construction. There are fewer pitfalls.

Error is more easily remedied in thought, description, and drawing than in the physical operations.

Good engineering is that which produces the most for a dollar.

It is not sufficient that engineering shall produce good results regardless of cost, nor yet that it shall be economical with impairment of results.

Sufficiency is of prime importance, but its cost must always be reckoned and rationalized.

In working engineering economies, the greatest opportunity, perhaps, lies in design; the next opportunity is in field methods and administration; and the next may perhaps lie in the purchase of materials; to which may be added the economy which follows upon close application to details.

While it is nearly impossible to give relative rank to these opportunities for economy, and while each opportunity will vary in different classes of work, I wish to correct the wrong impression that the greatest economies lie in purchasing.

It goes without saying that the lowest price should always be obtained on various articles, without impairment to quality, but the difference between any fair price and the lowest price that can possibly be obtained represents a saving which aggregates less than the economies that are obtainable through other channels.

It is sometimes considered that close attention to details produces the greatest economy. This is worthy, even essential, but no shrewdness in purchase or close attention to detail can yield the economies possible in design and field administration.

Design will often cut costs in half, instead of saving a few per cent. The proper conduct of field work will often produce savings directly through labor, and indirectly in time, which are far greater than usually credited.

The successful constructor works fast and has a knack of organizing good methods, bringing materials and machinery on the ground at exactly the right time, thereby obviating delays and providing ways to finish, tuck up the loose ends so as to complete the construction, clean up, and get out, and thereby stop expense, whereas the reverse process keeps the job dragging along, suffering from all sorts of useless expense, due to interference, delays and loss of service. The consequences of delays are usually greater than their causes.

Specifically, in the conduct of construction work, there are so many things to guard against that I can only mention a few. There are the pools and combinations which affect prices, and it is sometimes very difficult to avoid paying twice what certain material is worth because the job is set up by those who control the markets, and it takes more than engineering ingenuity to circumvent such oppression.

These pools extend from manufactured articles and raw materials to contract bidding. This latter takes the form of certain contractors getting together in committee, showing their intended bids to each other, and agreeing that the one with the lowest price should have the job. There may be ten bidders thus in collusion and they agree that each should add \$100,000 to his bid, and when the final award is made to the lowest bidder he rebates \$10,000 to each of the other nine, who take this sum as a slice of something they did not earn.

I could recite the details of a case in which about a dozen bids ranged from \$200,000 to \$212,000 on a certain piece of work, on which all bids were refused. A reliable engineering constructor performed the work in a first class manner, at a fair profit for \$115,000.

Other instances could be cited in which the differences were not so great, but which further show that competitive bidding is not always what it seems. In fact, the great fallacy in competitive bidding is that by it one does not usually get competition. The theory is good but the practice is open to too much malpractice.

It is of the greatest importance that engineers have a strong sense of cost in order that their judgment may detect these practices, which sometimes are almost criminal. It is pitiful to see a certain class of architects and engineers advise clients to accept a certain bid because it is the lowest and made in due form, when its figure is only somewhat less preposterous than the higher bids.

On the other hand, it is a fact that bids are often made so unreasonably low as to be unsafe. This usually follows from ignorance on the part of the bidders, which leads to their underestimating their own cost. It may sometimes be good policy to accept very low bids, but there is hazard in letting any contractor undertake work at a price at which he will surely lose money, and the engineer must, through his knowledge of costs, be largely the judge of this.

In heavy steel construction, methods may be observed which require the engineer's close scrutiny. If structural steel is required and is to be furnished on a lump sum bid, and the contractor, as is the custom, is permitted to make

the working drawings from the general drawings supplied by the engineer or architect, there are methods by which the tonnage and its cost to the contractor will be largely reduced below the amount which the general drawings contemplated.

Again, if the bids be taken on a pound price, the tonnage to be weighed and duly accounted for, it is not difficult to run excessive tonnage into the heavy cheap shapes and deficient tonnage into the smaller expensive shapes, and thereby make large gains in the total delivery at the fixed price per pound.

Such practices are reprehensible and are to be guarded against, but it should not be assumed that those who practice them are fundamentally dishonest.

Competition is called the life of trade, and the sagacity of buyers often forces out the last margin of profit, the natural resistance to which leads to the employment of various methods to offset the destructive effect of forced competition, leaving considerable to be said on both sides of the question. It is, however, largely in the power of the engineer to conduct his client's work so that these practices will not be largely resorted to.

I wish again to refer to the economies that are possible in design, but time would not suffice for their full consideration. I could, however, cite the case of an extended heating plant which, along conventional lines, would have cost about \$80,000 but which, through fertility of engineering design, was reduced to about \$40,000. I could also cite the doing of heavy concrete work at a saving of about \$1 per cubic yard over ordinary methods; also an electric-transmission line in which hundreds of thousands of dol-

lars were saved from what would have been considered ordinary cost, by close application to engineering design and willingness to break away from so-called standards, which were standards in name but not in fact.

KNOWLEDGE AND ACTION

An Address Delivered June 8, 1906, to the Class of '06

Staten Island Academy

By WALTER C. KERR

SOME days come so seldom that they become occasions of special mark. The day of graduation is one. It sometimes seems as if young people come to halls of learning with little and in a few years take away much. This is not quite what happens. You come with much or little as the case may be and you take away just what you brought, except for the pruning, training, and straightening out which your natural possessions have undergone by the process known as education. Meanwhile, you have acquired some facts and these are, of course, an added measure to what you formerly had. Many of these you will unfortunately forget, but do not think that they have not done you good while they stayed with you, nor that their effect is measured only by their endurance.

The only objection I have to commencements, whether of academies or colleges, is the intimation that they are the end of education and the beginning of the world. Education is a continuous performance, the first acts of which are within halls where systematic guiding gives direction and method to personal endeavor. One reason why many who have had much schooling are poorly educated is that they stopped learning, and by a strange anomaly they seemed to stop at commencement.

The education you get through books and teachers is

elementary. That which you gain yourself may be profound. Profundity is wholly a matter of quality, not quantity. The world is too full of a number of things, and you will find more tendency to scatter than to concentrate. It is therefore well to do whatever you do with all your might and regard nothing as too small to be done the best you know how. Cleverness will not accomplish much. Brilliancy only serves to polish good things permanently and to polish bad ones temporarily. Grace and culture lend charm to anything, but none of these things make for progress. Advancement only comes through good hard work, diligent application, faithful performance, correctness, accuracy, and that fine display of judgment which flows only from a well-ordered mind, capable of thinking independently, acting resolutely, and fearing nothing.

At this commencement time it is well to commence to forget the standards set by the completion of printed pages and the measure fixed by examinations. The world's problems do not come systematically and in the preferred order of easy ones first, followed by a graduation to the most difficult. They come by chance and they hit you endwise, sideways, and with all degrees of percussion. You must meet them, solve them, get good out of them, and utilize them as the means to further advancement.

Some persons devote much time to passing opinions stating what they think. It does not make so much difference what you think about things as what you do about things. There is even danger of thinking too much unless thought is intuitively coupled with action. Your thoughts may sometimes wander harmlessly, but your acts need to be right all the time. If you can begin now with the ele-

mentary education you have received in a good academy, or even the more extended but still elementary education which some of you will receive in college, you can proceed to make your personality effective in doing those things which your natural tendencies lead you to do best. You will then, in the course of perhaps twenty or more years, become fairly educated as measured by the standard of human performance related to the average span of life.

Humanity is composed of all kinds of people possessing widely different temperaments, tastes, and abilities. It is well they are not all alike. Anyone will achieve most through the opportunities and training which develop native powers. Any other training is liable to stunt the natural growth. Variation in progressive development should be in the direction in which one tends to vary. This assists in the survival of the fittest, the survival of the unlike, the survival of the effective.

Manifestly there must be as many kinds of education as there are types of people, and fortunately the number is not so great but that they can be readily supplied at least within our higher institutions. As long as education was confined to one channel, those whom the channel precisely fitted were greatly benefited; those whom the channel somewhat fitted were somewhat benefited; those to whom the channel was a misfit were injured because during the formative period of their development their native power to vary was resisted, their minds forced away from their natural trend, and energies which could have been potent for good in certain directions were dwarfed by the compulsory exertion of uninteresting, unproductive effort. This results in a kind of mediocrity which is stagnation.

You can't make anything good of a man except to make him better in that which he is. You can't unmake him and make him over again.

If it be held that one must needs have the so-called liberal education in order to be well rounded, it is pertinent first to determine whether roundness is what is really wanted. We don't build walls of round stones. We hew them square. Some are better rough hewn and others are better when polished. It is not well to attempt to take all the corners off humanity. They should be left on to dent something.

When it is observed that in our modern universities which offer to students wide ranges of educational courses, less than one-quarter follow classical pursuits when left to free choice and that over three-quarters elect professional and industrial education, there is good reason to believe that this is about the proportion in which minds are fitted to receive benefit from the acquirement of the respective classes of knowledge and training. I therefore maintain that, instead of decadence in the humanities, they are elevated by this natural selection, because their representatives are only those whose minds are fitted for such education and who will therefore conspicuously represent the best possibilities of classical training.

In addition to the several agreeable and desirable attributes of classical training, its fundamental benefit comes through the melting down and recasting of thought which to some minds is a stimulating and cultivating process. There are other processes of like kind and quality that are adapted to other minds, notably the melting down of the laws of nature and recasting them as applied science. An-

other cultivating and most useful process, too little practiced, is the melting down of one's own thoughts and so recasting them that they can be understood.

We have heard too much about knowledge for its own sake versus knowledge for use. All knowledge is for use. All education is for action. The engineer uses mechanics and thermo-dynamics in a certain direct way. The architect uses art and constructive knowledge in a similar way. The lawyer uses his knowledge in a less material way. The classical or philosophical man uses his acquirements in a different way, but if he does not use them they are useless. The older I grow the more I think there is no such thing as liberal education, liberal arts, or liberal anything, as distinct from specialized departments of knowledge. As to the so-called specialized courses, these are only names. They are no more special than the humanities. Some are scarcely so highly specialized. All education is liberal or all is technical, according to our definitions, but all is for use.

We hear rather too much about standards. They are all right in their way, if they do not tend to crystallize error. What we want are best methods. They can never become quite fixed, but must always be getting better in order to approach the best. They must be effective and efficient rather than old or new. Precedent has no inherent merit. Only merit has merit. Times, conditions, and arts change so rapidly that the presumption is against rather than for the older methods.

One must have the reserve power to do more than conventional duties; to double or treble the pace when necessary, but there should be no waste energy trying to do it

all the time. In large organizations, men of fair attainments who have shown no surplus capacity are dropped to make room for others who may be more available in time of emergency.

There are many who would rather rest on an excuse than find a way. Too many find reasons for not doing things. So you must prefer to do things and not be content with reasons why you can't.

To youth this old world is always a new country. Pioneers must plunge in, turn over what to them is new soil, and make of it the best they can; always in the spirit of industry and honesty, with that aspiration for betterment which invariably turns for good that which is worthy and turns to naught that which is undesirable. Thus you plunge, step or wander into a new world and the impetus with which you enter it is a factor in the *vis viva* with which you will carry through. Repose has its virtues, but you will always find it easier to slow down than to speed up.

A part of all human performance is perception, and the other part is acting upon what is perceived. Never mind the formula. Go straight for what you see and you will always find your duty right in front of you. Stay by it until it is done. Do it simply and you will do it easily and well. Never mind your knowledge. It isn't your power. It is only a tool and it is inert. You are the power, and if you don't exert yourself and assert yourself you can't wield anything. Your own human effort is the only thing which will appeal to and move others, and it is only when you move others that you move anything. Don't be impersonal, but be yourself with all the fire that nature gave you, and don't be afraid to be yourself — your best self —

and let the world judge as it may. You are never so much yourself as when you forget yourself, and you are then unselfish.

All things are more or less hard to do, and work only will do them. Get a right idea of work. Don't trust to cleverness. It is worthy, but it will not do your work. Accomplishment demands singleness of purpose and concentration. All exterior forces tend to diversion from these essentials. Here you come in again to show your triumph of personality over environment. No matter what you do, from the humblest incidental thing of the moment to the consummation of your greatest ambition, the same principles of human activity apply. All will be clear sailing until you meet resistance and sometimes you will run against it hard. Then you will find whether you have nerve or nerves. No one can help you much. Your measure is being taken and you win or lose upon the cumulative ability which you can muster as the total assemblage of native talent and all that has become a part of you through all the influences that ever entered your life. See to it that they all shape one way. You will meet some disappointments through your own faults and some because the world is not exactly just, but whoever gets approximate justice in the world is doing very well. The perfectionist has a hard time. He meets continual disappointment, especially if he is chiefly worried about the imperfections of others.

The nearest you will ever get to perfection is when you get out of your powers all that there is in them. You will find them stronger the less you dilute them with borrowed force. The good you accomplish must be a part of your-

self, and whatever you may receive by way of knowledge, experience, and training must be assimilated until it is a part of your own living being before it can be made productive. The capacity to perform is essentially a human creative function and not an act of transmission of what you may have acquired.

You are going to breast a gale of advancing and ever changing arts, with all their complexities, anomalies, and uncertainties, where "nothing there is can pause or stay." Thus duty is made harder to perform than if you lived in the quiet conventionality of a less enterprising land. Difficulties and their overcoming bring opportunities, and who would ask for ease at the price of stagnation? However powerful and individual you make your personality it must in general conform to the well-determined laws of effective human procedure. Freaks never win. You may follow more or less the systematized results of practice but you must obey the laws of purpose, of motive, of integrity, of unselfishness, of diligence, faithfulness, and fidelity to trust. Transgression of these will be punished, while decadent variation will only produce an imitation of the real thing, and all imitations are bad.

I assume that those to whom I am talking are capable of being many times as good and effective as they are now. Effectiveness gets fairly weighed and compensated, financially or otherwise, by the world's scales. You will never be paid for what you are going to do, and you will be only partially compensated for what you have done. There must be a profit in everything and therefore ability to perform must be bought at one price and sold for another. With growth compensation will grow, and no small part of

growth is the ability to rise and do the things that need be done, no matter what they are; to rise from selfishness to unselfishness, from smallness to greatness, and from anything to competency.

There is a wrong notion in the world as to the sequence of some things. You must first perform and re-perform and prove that you can perform and keep it up before you will get credit for performing. A large proportion of the people in the world cannot do certain things because they have never tried, and many have thought they could not because they did not do very well the first time they tried. There is nothing pertaining to your general conduct in the world that you can't do. People become what their motives lead to. Consciously or unconsciously your motives make you and your practice will follow from what you have thus been made. The personal shaping of one's self along lines however worthy cannot be accomplished through initial intent alone. It requires a burden upon the mind, a mission in the heart, and a continuous motive in life's work.

If these things are good, then they are good to contemplate, but contemplation of itself avails nothing. If you ever expect to get anywhere you must move on. It is not always necessary to step lively, but keep moving. There is a tendency in human nature to expect to find a stopping place. The spirit of moving on is the spirit of optimistic dissatisfaction. It is not necessary to cultivate restlessness in order to have a moving spirit. The fault and the fate of the rolling stone is not so much because it rolls as it is that it usually rolls down hill. When you move be sure of your direction.

Progress should mean something. It should mean real advancement in thought, habit, and action perceptible to one's self and to others. This moving on may be adapted in one form or another to suit different temperaments. To some it should mean moving onward within few and perhaps limited lines. To others the onward movement will involve the constant taking up of new and broad lines of effort. To many it is refreshing as they progress from one period of life to another to awaken new interests, to have new ambitions, new fields to conquer. While to some the activity of this added effort might seem too strenuous, there is little doubt to others it is an enriching progress which by recreative and interesting variation revives and stimulates mind and body to a condition of existence in which they last longer than if allowed to go to seed.

The least duty of everyone is to make the world just a little better. This can't be done by merely approving and imitating what others have done. You will never do it looking backward. Ambition seeks new seas to sail.

No one should dare to prejudge what any person may do and to everyone are open all the possibilities of all that has not yet been performed. The lessons of the beaten path are yours for the pains of acquirement. The inspiration of the successful achievement of others is yours for the seeking. The opportunities of the future are yours for the seizing.

WHAT ARE YOU GOING TO DO?

An Address Delivered by WALTER KERR at Pomfret School, Pomfret, Connecticut, on Prize Day, June, 1907

AN analysis of characteristics helps to determine what a young man is good for. When he is forty years old he will have found out what he is good for without analysis; but while he is in his formative stage and receiving his education it is important for him to look within, to understand his main characteristics, and then to shape his education and life work consistently with his best abilities.

The important question is: For what is one best fitted? Some have such strong predilections that the question need hardly be asked. One seems to be born an artist; another an engineer; another has a taste for architecture; while another aspires to be a doctor, a lawyer, a banker, or in some way shows a marked tendency toward a distinct business or profession.

There is nothing in human nature to make a man want to be a banker, a lawyer, or an engineer. There were no such professions until human nature was quite old; they have resulted from the customs of the times, which may change. New professions will appear, as those of patent solicitor, railway manager, actuary, promoter, and electrical engineer have appeared within the memory of those now living. On the other hand there have been artists, poets, authors, and architects ever since man began to make a record of his activities.

There is nothing in a man's nature that particularly fits

him for a given vocation as defined by a name. Each man possesses various powers in varying degrees, and the combination, rightly applied, enables him to accomplish a certain desired result to which we give a name. But do not be deceived by a name; and do not think that one man is only good for one specialized and named vocation, while another man is only good for some other work, and that there are no degrees between.

For instance, among the prominent characteristics of mankind are: artistic sense, mathematical insight or analytical perception, and constructive ability. A combination of the mathematical and constructive gifts may produce an engineer; whereas the artistic and constructive combination may produce an architect. Combinations of the three would probably produce better engineers and better architects. The mathematical and constructive gifts are frequently found together; likewise the artistic and constructive; but the mathematical and artistic talents are seldom found in the same person. When the three are combined the result is a very effective man of the constructive type.

Now, if to any one of these combinations there is added intellectuality, power of imagination, literary ability, or philosophical capacity, the result is a broad man and probably a versatile one. There has thus been added something of that which increases the scope of contemplation, and the power of expression. It matters not whether the manifestation is through spoken or written language on the one hand, or through performance on the other. The power of contemplation and expression is thus enhanced, whatever the form is in which it appears, and all other faculties are rendered more effective.

It would be impossible to formulate all the combinations; they are too manifold; and between the main combinations there are many variations due to predominance of different characteristics. Yet any one of you by careful thought should be able to evaluate his dominant traits. You should begin this at once. No man can begin too young on self-analysis. He ought to know just what kind of a fellow he is. He ought to think about what he likes and does not like; what he can do and what he can't do, and he has usually lived long enough to know these things quite well. You should occasionally stop all the little things you are doing and sit down and think about yourself. Think about what you find in yourself that is usefully good, and then what you are going to do about it. Of course you have not had much experience by which to judge yourself, but there is no time in your life when you will have more experience than your years have permitted. Every moment in a man's life is a fresh start for a new run. You can't run ahead of yourself, and the only time to begin is now. It makes no difference whether you are twelve years old or twenty, and if you begin a little young to acquire the habit of thinking about yourself, what you can do and what you can't do, you will find that when you are eighteen or twenty-two you will have formed a habit which will stand you in good stead.

There are some milestones that each one has to pass. One is just before college, and another is just after graduation. These milestones often stand where the road forks, and if you don't know which fork to take, it is a good time to stop and think. There are several ways of getting at the inside of yourself. You can tell something of what you like

best by just thinking about it; and while you are doing it don't wander off to think about something else. Another way is to notice how well relatively you do different kinds of things. Your studies, for instance, show whether you are better in mathematics or Latin; at natural science or history; because you always do best and most easily the thing that you like best. To like in this sense is not merely a matter of pleasure, but an unconscious mark of competence.

When you begin to know what you have by way of taste, talent, liking, and ability, you do not have to choose a profession at once, but simply to shape your further course toward the ends that you may choose. Thus a man may take a classical, literary, philosophical, scientific, or engineering course, according as one or the other appears best to fit his controlling tastes and abilities, and through these broad channels he will reach the narrower and more highly specialized ones.

The choice of a man who knows exactly what he wants is easy. The best course for those who seem equally good in all things, without special excellence in any, is not so readily determined, and I do not know whether it is fortunate or unfortunate that so large a number are in this category. Self-analysis may sometimes bring decision to such men and reduce the number whose ambitions and talents are indeterminate.

Such men, if about to enter college, should choose an institution which offers a wide range of studies, instead of a college which may be either strictly classical or strictly technical. A university full of diverse courses is a little world in itself, a place of transition between the home and

the big world. There a man comes in close contact, through class work, friendship, and sport, with groups of men of widely different tastes and motives; he rubs up against them and something rubs off. He gets new impressions, new ideals, new suggestions, and unconsciously begins to associate with certain groups more than with others, and finally with one group; at last he finds himself strongly attracted to a line of effort which leads to his life's work. I consider the college which offers but one channel for education as useful only for the few that this channel fits exactly. I have much faith in a democratic institution in which all kinds of education are considered equal.

Most of you will have some good reason for choosing the college to which you go. The poorest reason is because your father went there; the next is because you know some good fellows who are going there; the next is because you aspire to be on a certain team or crew. Another poor reason is because you think you want to be known as a man of a certain university. The only good reason is because you believe that the college you choose will give you the most help; and this with definite knowledge that what you need is offered there. Many a man has made the mistake of his life by trying to grow in a wrong atmosphere.

All education, all university life, all these processes through which you are now going, or hope to go, are not ends in themselves; they are only means to ends; the final ends are what you must reckon with, and sometimes the thing that is best for you is not what you think you prefer.

Nearly all academies attract men from a comparatively narrow range, geographically and socially. There is an unconscious tendency on the part of any body of men to

feel that they are all right, and that something far off must be inferior or a little queer. It was an old lady in Kansas who on hearing that there were millions of people in New York City remarked that it seemed strange that so many people lived so far away.

You are mostly from New England and New York, a very small area as compared with the world. It would be a surprise to most of you to know what this country contains by way of men, old and young. It would surprise you to know what they are doing, and how competently other young men are fitting themselves for life's work. They may not be as well cared for or as well instructed as you are at home or in school. They may not have as many amusements. They may not have been brought up in so refined an atmosphere, nor have had as many advantages. You might call their environment rather crude. They have not had opportunity to be as good at sports as most of you; but when you get out in the world and begin to do something, look out for their competition; they are being so well educated that some day you will feel their power. You do not have to believe this now, but just put it away in your memory, and later you may come to believe it when you see them chosen for high places. You are being better educated and trained for your life's work than those who are compressed into the schools of the cities in more restricted environment.

You have it in your power to gain for yourselves, if you will, some of the things which are the natural product of that part of the land not yet dominated by set forms and constraining customs. Some of these are: the cultivation of that resoluteness which springs from necessity; the

directness of thought and action that is born of simplicity; the manliness that is always considerate and kind without thought of social distinction; and the power

“of a noble mind
That never fails nor abates
But labors and endures and waits
Till all that it foresees it finds;
And what it cannot find creates.”

I am in sympathy with about everything that boys do, or want to do, when left to their own free choice. The story is told of a boy who was suspended from school for carving his name in his desk. Later he repeated the offence and was expelled. His mother in distress sought work for him in a neighboring factory; she had made sacrifices to keep him in school, but he was not wanted there; hence he must work. The proprietor asked what he had done that was so bad, and when he heard, said that he wanted him; that he wanted boys who could carve their names in anything that was in front of them; who couldn't be prevented from carving; that he had a hard time getting young men that could carve at all. This boy became one of the most useful men in the establishment.

While it is not necessary literally to carve furniture to show a spirit, one can easily appreciate that this boy was so pent up that he had an irresistible yearning to express himself in his own best way which transgressed the disciplinary standards of his environment. I sometimes feel that I would rather see all the school desks carved than that too much restraint should keep boys from their most natural expression of themselves.

We all know the merits of discipline. You have felt its

hand and know that it did you good. You know what it means in everything from work to sport; but, broadly speaking, discipline that is merely restrictive to no end, cramps and fetters; while that which compels minor things to yield to major ones, makes for progress. Discipline needs to be fundamentally creative rather than restrictive.

We are making too many butter-patty boys by compressing them in a mold with an ornamental pattern on top instead of letting what is best in them come out, however crude it may be, and then developing whatever is their own to their own best advantage. That is why the palm of achievement has been so often handed to those from the fields where men grow to be what they incline to be rather than what others try to make them. You may think of such men as appearing a little brusque, sometimes unrefined in manner or expression, occasionally uncouth. This however is not the class I have in mind; but rather the type of young man, now becoming so numerous, whom you will meet in the world's arena, and who, like young Lochinvar, has come out of the West, full of power and resource, and yet with such grace that you will need to be told whence he came.

What you boys need is to be up and doing and to be strong. Don't be afraid! Your foot-ball and other sports do more for your characters in this respect than many of your silent hours of study. Your sports not only exercise your muscles but fortify your strength to make you fearless. They cultivate your self-control, sharpen your wits, and enhance your capacity for team-work, your determination to play with or against your fellow-men and to play

fair. You need to do many things in the world just as you play ball — to go at it with all your might and excel the other fellow. If you concentrate yourself on it you will always find it a pleasure. Learn to do things quickly; make every stroke count. Whenever you learn a good thing, in sport or otherwise, carry it into the rest of your life and let it help build you up. Learn to understand yourself, and to shape your course aright; shape it in accordance with your tastes during your earlier periods, and in the later periods more concretely and specifically. Then you will find yourself and will gain power to grasp your opportunities and to make the most of your vocation.

Finally, you will be just what you make of yourself, without much aid from anyone. Even though you can't foresee just what that will be, you can tell, by self-analysis, whether you are on the right road, how well you are faring, and what you should do to fare better.

THE NEXT STEP

An Address Delivered Before the Senior Class of the Polytechnic
Institute of Brooklyn on June 12, 1907

By WALTER C. KERR

I AM interested in education, but I have more interest in those who receive it.

Educators and institutions are seeking the ideal education, and they will find it when they find ideal men, collected in ideal groups, and doing everything in an ideal way.

In a certain way the ideal education is the education you get; and from a certain set of conditions one man gets one kind and another man another. In these relationships, apparently similar causes do not necessarily produce similar effects and the effects differ largely with the characteristics of the receiving body.

Each of you, under similar influences during the past few years, has acquired a different kind of education. This is not so apparent now, amidst the levelling tendencies of the conventionalities by which you are all brought to a certain stage at a certain age, surrounded by the same conditions and, therefore, apparently all more or less alike.

This day, however, marks your individual departure from conditions common to you all, and five years will find you translated along many different radii. Ten years will find you far apart.

Up to this time some one else has done the directing. Hereafter you will direct yourselves. Perhaps, under cer-

tain terms and conditions of employment, you will think some one else is directing you in a rather firm way, but after all you will find that you are directing your own destiny, and the apparent direction of others is but the incidental utilization of your best powers and a desirable restraint of your worst ones.

About the first practical thing you will do now is to enter employment, and practically the next thing you will do will be to create unconsciously an impression of what you are good for. That impression will be best made if you will attend strictly to what you are given to do. Do it faithfully, cheerfully, and to your best ability, without trying to create an impression. We all know there is something about a boy that will make him climb a tree faster when the girls are looking on than when they are not, and the momentary stimulation of ambition is likely to produce a fall. When you start out into the world, don't get excited and overdo, nor feel that all eyes are upon you. No one is looking very hard, nor caring much. So just take care of the job you are on, and consider that it is the only thing eyeing you.

Those who have had large experience in dealing with engineering graduates have found them a pretty good lot. They ought to be. Any man who is not has something the matter with him. Whatever he has by the grace of nature, with the addition of what he has acquired by way of fact and instruction, coupled with the training which this has given him, ought to make him capable to an acceptable degree, even if his experience has not yet so matured his judgment and tempered his acts as to render him proficient.

The employer expects of the young man, fresh from his technical education, ability to understand, capacity to think, the possession of ordinary facts regarding ordinary things, logical procedure in his acts, faithfulness in performance, accuracy in observation, and general intelligence. He does not expect ripe judgment, practical knowledge of technical procedure, trained commercial astuteness, nor does he expect broad perception of the myriad of things more or less correlated with those on which he serves directly. These latter attributes follow from experience, and they will surely follow if the former attributes are possessed and practiced.

It is almost impossible to specify those qualities which most quickly lead a young man to rise from the lower position he first fills to the next and the next until he becomes a valued assistant and on the high road to leadership, but there is no one thing which so marks a young man in any organization as to be wanted. Young graduates enter manufacturing establishments, engineering offices, or construction corps, starting evenly in the race. Soon it develops that here and there is a man who seems to be wanted by every department. It would be difficult for those who want him to define exactly why. The man is as yet too young and his characteristics are too unformed to warrant any firm determination of his ability, but in some way or other he is wanted, and opportunity follows want, whether long felt or shortly realized. Cheerfulness in all things is not the least of the factors that enter into "being wanted."

When a man steps up because he is wanted, he must "make good," because this early and only half-formed

choice is not firm enough to stand unless warranted by performance. The burden, therefore, upon the man who is chosen is far greater than upon him who is not. Through his ability, diligence, perception, and capacity to render his potential possibilities in the form of practical service, he will find the rising steps always in front of him and will need to spend no part of his energy to find them.

As he proceeds further on his way, he may feel that he is doing much and doing it well, and this is about the time that self-centered youth forgets that after all it is only assisting. Some one else is carrying the responsibility. Some one else is the leader, and the effort of the young man has not yet been called to its greatest obligation, because as yet there has not fallen upon it the burden of final responsibility.

The day you get your first serious responsibility will be a far more important day even than this, because that is the day you will either carry the load or not. No one can help you much in preparing for it; you must do it for yourself. When the time comes that you take the burden, no herculean effort of the moment will make you capable of sustaining it. All that you have ever done, are doing now, or are going to do up to that day will or will not prepare you for it, as the case may be, and the ability to carry responsibility is the whole test of leadership. It is not knowledge, skill, brilliancy, nor even genius that makes a man a leader, but only the power to carry responsibility successfully.

This requires a series of attributes beginning with proper self-confidence and ending with wisdom. Somewhere in the line will be found courage, firmness, honesty and

everything that composes high character. Each man should therefore cultivate that which is within himself and make the most of it to this end.

You are going out into the world at a time in which many things differ from their previous condition. The whole civilized world has ceased from the struggle for existence and has entered an age of plenty.

Originally in the struggle for existence men fought for food. The race multiplied while the material and facilities for its subsistence lagged. When any tribe or nation succeeded in getting a little more than it needed some other nation or tribe attempted to take some part away from it. The effort of the individual and warfare of the nation were practically a struggle for existence. The development, however, of civilization, the arts, and the sciences has produced a rich world. The land more than supports the people. The industries give employment to all who are willing to work, and at a good wage. Broadly speaking, poverty is unknown. Individually, it only exists as a pitiful extreme of incompetence. The world is affluent. Farmers are prosperous. Science has unearthed mineral wealth. Manufacturers are industrious. Enterprise is almost rampant. Everywhere the world is calling for men to do things, and is willing to pay well for capacity. It is the age of surplus, in which the farmer and the artisan have bank accounts, and a few, even many, are rich. Men are not seeking work, but work on every hand is seeking men. This condition is so very recent that it is perhaps not fully realized, but it has come with the present generation, and will have a favorable influence on all men now beginning their life work.

Meanwhile transportation and all that attends it has increased the radius of individual action, and therefore of personal opportunity. A man can now pass from one grade of employment in a given locality to a higher grade in any other locality of a land three thousand miles broad quite as easily as in the early days he could make the change from one city to a neighboring one.

Conditions of life, too, are more fixed, and change of location, even of occupation, involve less of risk, hardship, or of social, physical, or mental disturbance than heretofore. All conditions have therefore grown more favorable for every man, with opportunity increasing in geometrical ratio as related to the abilities of different men. The premium on marked ability has therefore increased, while the reward for capacity has become more assured. With this, the standards of performance rise as responsibilities grow greater; but to meet this the facilities enabling the man to make the most of his potential ability at an early age, proportionally increase.

You are therefore going out to a well formed world, in which more has been done to prepare it for the exercise of your ability than you have done in the cultivation of your own talent. I do not mean by that that all of the roads have been straightened and the ways paved. The world is still humpy and bumpy, and you will find it hard in spots. Human nature remains unchanged. You will meet the resistance of men and the imperfections of material in this age the same as in any other. You must be strong — not only strong enough to meet the encountered resistance, but so much stronger as to overcome it easily.

There is something about effectiveness which has to do

with grasping things which are within reach and using them, and not speculating on something that is beyond grasp. The possible benefits which can arise through unattainable conditions are of no value. Power is the quick adaptation of things at hand to needed ends. Therefore vision must not be too long. See the things that are near and see them right. See their possibilities and recognize their limitations. Act with reference to them, use them, and keep the horizon within practical working range. This for action, but as a matter of mental gymnastics, as an expanding function, as mind training, it is well to use the imagination to reach out to any length and to what may lie beyond. Then, before action, draw in the lines to the radius of action which can be made practically effective.

Much has been said from time to time about the inferiority of knowledge gained piecemeal as against its acquirement in substantial masses. The former is liable to be superficial and incorrect; the latter profound and competent.

The scattering of knowledge into little bits covering a wide range is catered to by many forms of literature, whether general or specific, which finish a subject almost before it is begun.

This tends to the scattering of brain effort, the splitting rather than the cementing of intelligence, and to the fickleness of flitting from thought to thought and motive to motive in a manner leaving no fixed imprint on the mind thus operating. It gives, also, little more than the appearance of a brilliant film or veneer of learning to those who view its results. It encourages suffusion and dilution instead of concentration.

On the other hand, the concentration required to hold to one subject, and to acquire one class of knowledge through a considerable period of time and carry it over a broad area in which the units of surface are of somewhat like kind, tends to profound acquirement.

All this in a certain way has a bearing upon creative work, and it is creative work only that makes the world move on.

There is no merit in breadth obtained at the expense of depth. All mental effort, acquirement, and knowledge need the strength, constancy, and power which come only by dealing with large masses through reasonable periods of time. This to some extent accounts for the power manifested in some men who have studied little, but what they know is theirs and theirs for use, as against others who have scattered over so broad a range that they have a little of much, not much of anything, and nothing for use. The old maxim of "Do a little and do it well" may be improved into "Do much and do it well."

Science and engineering can not be picked up from popular expressions or the rambling through attractive descriptions of novelties, but only from the study of the fundamental principles. Therefore read books. Study principles, not novelties. Think theory and work practice. Turn to real sources, not to the tricks of words and platitudes which so often catch one's fancy, and in a superficial way lead to notions rather than to logic.

There is something in the very system of education that constrains one to think that everything must be done systematically. It is hard to say anything disparaging of so good a thing as system. It surely has its place. It has

merit. It should be cultivated. But again, it has faults. It has the strange anomaly of being both natural and unnatural. It is natural because all nature grows systematically, evolves systematically, and all profound things move more or less systematically. Nevertheless, much is encountered that seems to know no law, and chaos is not always best met with system. Many things from warfare to commerce show that system vigorously and profoundly applied will win against force used indiscriminately, but, whatever of such truth may be derived from generalization, one should not lose sight of the plain concrete fact that a refinement of system does not always best fit practical conditions as they exist. Such conditions often demand going straight at the obvious mark regardless of system.

It may be observed that system is cultivating, and it is therefore well to cultivate system. But with it cultivate the capacity to break through it temporarily, effectively, and for good cause.

To succeed, you must above all things be what the world calls practical. The practical man is the one who understands the things about him.

Foresight is the carrying beyond present view the knowledge of things within view. It is the practical man who displays foresight and thus is called wise, or prudent, because through the knowledge of things about him he can extend his judgment to those beyond.

Knowledge in the form of learning is inferior to knowledge in the form of discernment, because it is less effective. The former may be admired, but the latter is followed.

The boy who "wants to know" is the right kind. Get next to everything next to you. You can't successfully deal with large things far removed unless you understand the small ones near by.

The practical man thinks quantitatively and qualitatively, while the impractical man thinks qualitatively only.

The failure to recognize quantitative analysis in mental action is responsible for many misconceptions, poor judgments and worse acts.

Too many men allow their minds to form judgments on a qualitative basis only, so neglecting quantitative considerations as to reach wholly wrong conclusions. The question of many things is not whether, but how much. To realize that one thing is better than another is of little importance unless one determines how much better it is. The value of the fact that one cost is greater than another is measured wholly by how much it is greater. Perspective is a relation between size and apparent size. The effective man has an ever present sense of proportion. The dreamer does not so relate things to each other as to make their ratios real. The habit of quantitative analysis and the attaching of quantitative values is of even more importance than a general idea of qualitative relationship.

Express yourselves. There must be an impulse to expression; follow it without fear. Thinking twice may be overdone. Think right once and act. The impulse to act on every point of knowledge is inspiring even if conditions restrain action. It is the desire to act that causes activity, and nothing but action can produce results.

Finally, I ask you to be individual. Base your individuality on correct knowledge of fundamental principles.

Make them your own and not merely things that were told you or what you may have read about in books. Make them your own so firmly that you understand them with the fulness of your own nature. I mean not only the natural laws of physics, chemistry, and economics, but the laws of right and wrong, the principles of equity and inequity, the comprehension of the essence of things as distinct from the incidents; a realization of commercialism and its ever constant relation to the effective application of all laws; a clear perception of facts, and ability to use the five senses as well as the one brain.

Never mind conventionalities except so far as they are good when measured in terms of higher laws than set forms. At least one-half of all conventional methods in the performance of the technical arts are inferior methods retained through precedent.

Above all, be courageous, consistent, considerate, and cheerful in order that your talents, and the best attributes of your nature, may have fair play in a world that wants your service so long as you render it in the right spirit.

ENGINEERING PERSONALITY AND ORGANIZATION

An Address before the Graduating Class of Rensselaer Polytechnic
Institute. June, 1908

WALTER C. KERR

President, Westinghouse, Church, Kerr & Company

I HAVE a few words to say to you about engineering individuality and organization; about the breadth of the man and of organizations; about team work; also regarding the conditions through which each man reaches his fullest capacity for the performance of his best effort. I have also the suggestion to offer that you keep your eyes so wide open, and your perception so clear, that you will be able to sense in advance the training requisite for the highest attainment.

No definition of individuality, nor yet of organization, seems necessary. They have points of similarity and of difference. The individual, whatever be his traits, is always a part of a complex organization — in fact of many organizations. He is a part of human kind, of society, of a group of more or less like kind as in a profession; he is part of the organization of a nation, of a state, and probably of a municipality. At no turn can he get away from his part and companionship in organizations of many kinds. He has duties to render to all. But it is not thus broadly I refer to organizations in this brief discourse. I am limiting the consideration to individualism in engineering and organization work as carried on by groups of engineers.

Individualism has to do with the performance of a man himself. Organization has largely to do with what he will perform and what will be the result of his performance, especially as related to cognate branches and other human effort.

An engineer should be an idealist from youth to maturity. He must aspire to high position among men. Through his developed capacity he must grasp and control the inter-relationship of everything concerning an undertaking from conception to use. This grasp embraces the adaptation of all the varied branches of engineering to produce the ultimate results required in complex projects, and a special or expert knowledge of the predominating requirements. It should also cover a broad conception of finance, the accepted methods of procuring and accounting for funds, and a clear idea of the operation of properties after their completion.

With such an ideal clearly in mind, its attainment necessitates the appreciation that it cannot be achieved in a day, nor without long and varied practical experience. It must be sought with energy and discretion, and with earnest cultivation of breadth of view, character, integrity, healthful living, and useful recreation.

It is not given to all to realize their complete ideals, but as far as you are able to go you should make the results good.

No time can be more important or interesting to a young man than that in which he begins to apply himself usefully to his world, as he sees it. Consciously or unconsciously he will shape himself to some general line of action, which will result in his becoming a certain kind of man or type of

engineer regardless of the particular operations to which his talent is applied.

We all see things somewhat differently. We are all, more or less, creatures of present influences and previous conditions. The previous condition of any man with reference to any thing largely shapes his view, opinion, and action concerning it.

When the man reared on the mountain and the inhabitant of the valley view the plain, their impressions are quite dissimilar. Between the man accustomed to frontier hardship and one accustomed only to the luxurious ease of metropolitan centers, there will arise divergent views concerning the common plane of average surroundings. Thus labor and capital are liable to be arrayed against each other though their interests are really common. Many differences in the world arise mainly through divergence in view, following upon difference in previous condition.

It thus becomes easy to appreciate how men of about the same ability and influence differ in expression and action. What is often called reconciliation of views or opinions is, therefore, largely the bringing about of a similarity of mental attitude toward them. Tenacity of opinion is often only tenacity of position. Men seldom change their opinions so long as their view-point remains constant, but the broader the man the wider his angle of vision. The all-around judicial type lives on a mental plane in which he can circumscribe any problem, see it from many sides, and from his different views select the most important.

You have all grown up under quite similar conditions, and having been educated together, you start into the world from about the same previous condition. You have

been taught the same things that other civil engineers have learned. You have absorbed much of the conventional method of procedure, varied perhaps with a few odd strokes of originality which surpass the conventions. You have learned more or less of the traditions of an old and honored profession, and, as is usual, you have become largely the center of your own world.

There has not been much to remind you as yet that the world is full of conditions that you have not met, of men of types that you have not known, of motives that have not actuated you, of engineering that is not static; you have not yet met complexities and perplexities which require great skill and ability to handle; which may call for combinations of human effort such as you have not realized from your training.

However much you admire the achievements of the civil engineers of the past, you are more interested in understanding the mission of the engineers of the future. While fundamental principles are fixed, men and methods are undergoing constant evolution.

Every young man should realize that all of the manifold organizations of which he will in one form or another become a part, are ever changing. While fundamental principles never change, it is sometimes very difficult to determine whether a so-called principle is fundamental or merely an artificial product.

If there is any one thing more than another which I would say has any profound bearing upon the ability of a capable young engineer to succeed broadly in his profession, it is the correct appreciation of the relation between what he can render through his talent, and that rendered by en-

gineers of dissimilar kinds through the exercise of their talents. This underlies the relation of individual effort in team work.

Narrowness is largely singleness. Breadth is multiplicity, hence versatility. Narrowness and personal conceit are companions. Breadth and versatility lead to modesty, yet are often coupled with that self-confidence which makes a man a strong advocate of that which he believes.

The time was when all of the profound engineering of the world was static. The only engineer, whether called military or civilian, therefore, was the static engineer. Dynamic engineering was in its infancy, and a trade rather than a profession. The civil engineer occupied the broadening field for a long time and, therefore, was preëminently the man who practiced the profession so aptly termed "the art of directing the great sources of power in nature for the use and convenience of man."

An expanding world with its ramifying developments caused differentiation, which led to specialization, and there appeared many kinds of engineers. The field became too diverse for the individual man to encompass, and this led to the unwieldly, undesirable, and somewhat impractical division of labor and responsibilities which for a generation or two has existed. The authority vested in the man, providing he exists, whose breadth and talents cover all the requirements of great diversified and complex engineering undertakings, offers a more practical means of performance than its distribution among the many.

But we must deal with men as they are, and the necessities of great undertakings have so far outrun the individual that their performance demands a new type of

organization, combining the talents of the many and providing against their limitations, which shall exercise the necessary judgment and control.

All engineering operations are carried on through organization. The differences lie only in degree. The engineer with one man to help him is the simplest form. When an engineering corps is organized, the degree is raised. A large corps becomes complex and needs management, and when it grows so large as to be divided into squads containing men of different talent undertaking unlike work, real organization methods have been adopted. This group is further extended and made permanent for doing divers things for many people, instead of forming for an undertaking and disbanding on completion. Thus there has arisen the type of permanent organization, the creation of which is the latest phase of engineering development. It is rather less than a quarter of a century old, and it has attained high effectiveness only during about a dozen years.

This new type is not merely an aggregation of men, but a real organization, developed slowly, just as men grow; correlated slowly, just as men become educated; made effective by long processes of joint action and joint experience; rounded to a degree beyond that of any individual through the abrasion by contact of personalities differing sufficiently to shape each other, yet not differing enough to create friction.

This process has now been continued until there are several such engineering organizations, in the ranks of which are found civil, mechanical, electrical, and hydraulic engineers; also those versed in the special arts, such as lighting, heating, ventilating, machine tools, and com-

pressed air. With these are associated experts in thermodynamics, chemistry, statistics, architecture, law, and commercial affairs. There are also the usual draftsmen and assistants of all required kinds and talents.

Such an organization, even when composed of hundreds of individual acts, under proper management, virtually as one man. Its capacity obviously becomes great. On a given project the various divisions can be worked up in parallel, it being the mission of some to see that the different kinds of work are constantly correlated, and that when the work has developed to a certain stage numberless hands and feet are provided to attend to its performance.

This is one phase of modern engineering which has grown, unconsciously, by force of necessity rather than by specific intent. It has the capacity to create a property from inception to operative finish. It is always ready at a moment's notice to undertake work of any kind and magnitude. It is always available for emergencies. It has grown in response to the demands of complex physical properties which need to be created as a whole, with equal skill devoted to all their widely differing functions, which are too intimately related to be served by men whose work is not correlated by organization.

Financiers and others who must carry the prime responsibility for the creation of the largest works, desire to lean on the fewest individuals, and, as the complexity of their work would demand many personalities, they naturally seek firmly developed organizations which so combine these personalities that they can lean on the group as on a man.

It is frequently remarked that large work, costing mil-

lions of dollars and extending in construction over a period of years, suffers a needless hazard when entrusted to an individual who might die or be incapacitated by severe illness, or even possibly become mentally less competent as the work progresses. From these limitations, organization is the safeguard. Such organizations in general comply with the usual conventions and practice of the respective types of engineers employed. They contain ample demonstration of the strength of unity.

Parallel with the growth of such organizations there has been another development which might seem contrary to precedent, but which on closer analysis will be found to be rather a return to first principles. It is the performance by such organizations of constructive work, for a fee, in the unselfish spirit of engineering service rather than in the speculative or selfish spirit of contracting.

In the recent past, engineering work was usually designed by the highest talent but executed through common and almost unskilled labor. Further development constantly demanded higher grades of skill in performance and a closer supervision of the work by the engineer. This process continued until the time came when much of the performance of the work was of like kind with its design, and in order to get it correctly performed the engineer needed to put his hand to the work itself. This began chiefly in dynamic lines, and has extended to others.

I think the time has about arrived to conceive of engineering as beginning with contemplation, passing through design, specification and construction to full operation, with no change of hands, and with no break in the continuity of direct engineering control of the work itself. This

view one often hears unconsciously voiced by an engineer who, after all kinds of trouble and excess costs through contractors, says: "Give me the workmen with a few foremen and superintendents and I will do the work myself and do it right, on time, and within the estimates."

One of the Stevensons of Edinburgh, a family famous in engineering work for more than a century, said: "The duty of the engineer is two-fold — to design the work and to see the work done."

There have been too many artificial divisions as to where one type of effort should stop and another begin. A principal one of late generations has been the line between design and construction. This is not a natural division, but a purely artificial one, born perhaps of the practice of meeting the conventional views of a given time. Times change, however; practice varies, and it becomes easy to see that what seemed like natural divisions are after all only artificial ones.

A parallel to this is the system of so-called natural orders of plants. We are taught in botany to regard these orders as divided from each other by natural lines, and we therefore refer to the natural divisions. A moment's reflection, however, will show that there is simply a natural sequence from the lowest to the highest through which man has drawn artificial lines for convenience of classification, and thereby divided from each other certain orders which possess more or less like characteristics. It is the sequence which is natural, not the orders. So in engineering, from inception through to finished construction there is a natural sequence rather than natural dividing lines. Keep your eye on integration rather than differentiation.

The burden is upon every engineer to do his work right, and not merely to design it right and let some one else do it wrong. He may utilize any means of assistance, by contractors or otherwise, but if through such assistance he cannot get proper results, he must be able and willing to put his own hand to the work and bear his burden. The frequency with which assistance fails leads many by experience to do their work at first hand, and organizations of engineers largely follow this method in the interest of quality, economy, and time.

The importance of this to the young man is that with each passing generation a considerable change takes place in all modes of procedure, and it is not to his advantage to find that methods have changed while he is asleep. He should be alert to see what changes are coming and to meet judiciously those which are real.

I use this development of the engineering organization as illustrative of a change that has come, and it is indicative of others. Among these may be briefly mentioned the change that the individual engineer, as he becomes broader, is becoming more of a factor in affairs. His advice is sought in things other than engineering, yet more or less related. He is constantly growing more into the counsels of men of other vocations, and his stay there will be just in proportion to his helpfulness.

This development seems to run in cycles, returning periodically to the simplicity of first conditions. Early architects designed and constructed. Early engineers designed and constructed. Both grew with the advancing arts. Differentiation occurred. Professionalism arose. The professional men ceased to construct. Further advance caused

professional specialization. Creative forces scattered from the many to the many. Organization has brought together these personalities and, through well-ordered means, has returned in effect to the individual. The individual, then, through this effective organization, constructs, and we are back again to the early days in which the architect and the engineer both designed and constructed.

It was Emerson who called attention to the difficulty of stating one truth without violating some other. It is thus difficult to discuss the qualities of organization without giving rise to some misapprehension. I especially do not wish to imply that organization displaces or absorbs personality. Let no man fear that in entering an organization he is sacrificing his individuality. Individuality is not limited by organization, but the means of individual expression become changed. A man cannot be a bad man and a good engineer. He may think he can, but he cannot. A man will find his level, be it high or low, more quickly in organizations than elsewhere. His qualities and limitations become better and more quickly measured.

The necessity for the development of engineering organization does not mean that the day of the single-handed engineer is over, though it must be admitted that the years as they pass are constantly surrounding him with additional limitations. There are men who are better fitted for individual effort than for what is generally called organization work. There is also a great field for their effort. It is fortunate that all men are not alike, and that all work has not the same requirements. With the immense growth of material things, there has come such diversity of operations that there is room for every type of man, every

kind of temperament, and every form of good organization.

Each man needs to perceive where he fits best and to follow that in which his experience, and perhaps his opportunity, indicate the greatest hope of achievement, but nothing can be worse than for a man to fail to realize that there are many paths, some similar, others widely unlike; that there is room for all; that all work to a common end; that some ways are better than others for achieving certain kinds of excellence; and that the inferior ones result in mediocrity or failure. Many a man has made a signal success of his life working single-handed. Others who would have failed alone have done creditably in organizations where their best talent could be conserved, their weakness supplemented, and their limitations safeguarded.

The high specialization necessary for great profundity in any one branch of engineering tends to limit the capacity of the individual in the practical conduct of work, but not so when he exercises his effort through an engineering organization. For this reason, I believe the ablest engineers, to achieve their ambitions most completely within the time allotted to a man to work at his best, will prefer to identify themselves with organizations which carry the major burdens of physical operations, so that their portion of profoundly skilled service can be rendered into the largest volume of work.

There is much difference between things and the names of things. Thus organization is to many a name, but if any one will spend a quarter of a century developing an organization he will find that the name can be forgotten, except for convenient use, and his thought will turn to what it

means to perfect an organization and make it effective. It is not sufficient merely to bring talented men together. Men who are individually effective are often ineffective when grouped. Talent alone is not sufficient, but temperament and personality are factors of the utmost importance in the team work.

The relations of engineering organizations and of engineers with each other should be non-competitive. The word "competition" is too much used. It has a wrong ring. Engineers, like educational institutions, should each wish to excel, but not to the detriment of others. Thus they should treat with each other in the spirit of helpfulness, discarding all rivalry and jealousy. This attitude not only conduces to the welfare of all and to the good of their work, but also its free exhibition is inspiring to clients.

I am glad to see that this institution has broadened its scope to include other engineering beside that which it has taught longer than any other institution in this country. The reason this was done is that the day had come for it, and with the time there always comes the man to lead it. The day has quite passed for the classification of the different kinds of engineering. The growth of innumerable arts and the breadth of their application have produced a complexity which cannot be unraveled in the name of any one type of engineering performance.

A man studying one branch of engineering can acquire much knowledge of other branches through contact. This contact requires the presence of men and facilities, a broader world in which a man principally acquires that for which he strives, but also much that is useful which rubs off against him.

Some men have apparently great discernment for seeing about half way through things. In nothing more than in engineering is it necessary to see all the way through. This capacity is not altogether a matter of age and experience. It is born in some and cultivated in others. To see all the way through requires contact with all that is to be discerned.

Ability to think has not increased materially in the past two thousand years, but ability to get facts has. This marks the difference between logic founded on the intellect and that based on laws, facts, and real knowledge. The engineer starts from the latter, and if he will safeguard his facts his logic will not go far wrong. In one sense it may be said that a man's horizon extends as far as he can see, while his radius extends only as far as he can act. You need to broaden the one and lengthen the other.

Every young man should realize that the way in which he has been thinking may be outclassed by a way that has not occurred to him, and he should keep an open, wholesome, and receptive mind regarding all relationships in the world and all methods of performance, with a discerning eye to the advancement of method as the world passes from decade to decade, and to read the handwriting on the wall just a little before it is written.

Whatever exertion you may be willing to make to use your knowledge in the rendering of your engineering skill, do not neglect to use your personality. This counts for much. You may not be conscious that you use it at all. You cannot prevent its use wholly, for your personality will surely make some impression upon every one with whom you come in contact. If it is not the kind you par-

ticularly approve, change it all you can. If it is the kind that others do not seem to approve, it is your particular duty to suppress some of it and shape the balance.

Let every young man, therefore, with his strongest personality, his best effort, and with great confidence in his own resources, coöperatively join hands with his fellow-engineers and fellow-men in whatever manner seems, from time to time, best to render the service needed. This will be most effectively accomplished when performed in the spirit of Abraham Lincoln, who, in his wisdom, said: "You may do what you please with me so long as it is for the good of the cause."

THE POINT OF VIEW

An Address Delivered to One of the Graduating Classes of Stevens
Institute of Technology, and Later to the Students of
Sibley College, Cornell University

By WALTER C. KERR

It is a pleasure to talk to young men who are about to become engineers. It was not so long ago that I came to your age less well-prepared, perhaps, than any of you. When I look back at the engineering education through which men of my time were launched, and then consider the training you have had and the opportunities before you, I have reason to wonder why I am here.

I hesitate to advise you. You have already had so much advice that I do not know whether you can hold more. What I can say in a few minutes will amount to little, so let me use these minutes to suggest that you advise yourselves along certain lines which I will propose by way of point of view. If you look straight you will see straight. You can not think wrong and act right. Your perspective will be distorted if you have not the right point of view.

You are leaving a good institution for a good world. Your Alma Mater has built up around you excellent facilities for giving you what you need, and other institutions have likewise cared for their own.

The so-called liberal education has always been highly academic. Trade-school engineering has been strictly non-academic. The two have joined hands in our modern in-

stitutions. The liberal education has become less and the technical more academic, with advantage to both. There is, however, danger of engineering education growing too academic for several reasons. One is the disposition to include in technical training a liberal education which of itself is not undesirable. Another is that engineering professors often lean unduly towards academic views and processes, and thus lose touch with the spirit of the engineering world. Greater than either of these is the tendency of all things to move in the line of least resistance, and all learning which depends upon the intellect alone is more easily acquired than that which depends upon other sources. The proof is that no literature is finer than that written two thousand years ago; no philosophy has fundamentally improved upon that of the ancients; the highest flights of intellect and mathematics were reached during the ages in which the world was thought to be composed of four elements — earth, air, fire, and water.

A review of knowledge shows the great preponderance of the intellectual over the material, and it is only within late centuries, in fact almost within the past century, that the human mind has seemed capable of turning from the lesser resistance of intellectual attainment to the more difficult task of physical observation and comprehension. We have but recently come to the era of thought dealing with laws and principles which require insight greater than that of the intellect unaided by the senses. Contrary, therefore, to common belief, I assert that the highest refinement of knowledge follows from the highest use of the senses; and that it has taken thousands of years of pure intellectual development to attain a state in which the powers of na-

ture can, through the human intellect, be made useful to mankind.

Do not get a wrong conception of the faculties required in scientific research, in the applications of the laws of nature, nor of the powers of comprehension necessary in engineering. There is still room for doubt — not debatable here — as to what constitutes liberal education.

I hope for the time when the spirit of engineering as found in practice will form a more definite part of engineering education. This, I think, must come through the professor keeping in close practical touch with the engineering world. There are various ways in which this may be accomplished, but I know of none better than for each professor to do a reasonable amount of practical work for commercial purposes. Under some conditions this may be consistently accomplished during a portion of his time, but I am inclined to think that eventually our professors will devote all their time to instruction while they teach and will go out periodically, a few years at a time, for engineering practice. Thus the professorial life would not be so exclusively educational, and our growing technical institutions would be enabled to enlarge their faculties by engaging, for a portion of the time, men who are primarily engaged in commercial work.

Now that you have your so-called education, what are you going to do with it? I cannot tell you, but I can suggest some points of view.

Begin by forgetting yourself. All thought of self is some form of selfishness, and selfishness never produced anything better than more selfishness. It often breeds something worse. Genius is all right in its way, but it will not

do your work. Get a right idea of work. Remember that time is the essence of most things and is not inconsistent with thoroughness.

We hear much about opportunities. They are everywhere plentiful. Remember that your opportunity is the little one that lies squarely in front of you, not the large one which you hope to find further along. Many a man is surrounded with opportunities who never seizes one.

Your first duty is always to that which lies across your path. The only step which you can take in advance is the next one. This leads to simplicity of action.

The refinement of thought which is apt to follow high training often leads the mind to overlook simplicity and to seek complexity. It is thus easy to acquire that over-refinement, often called theoretical, as against the simplicity which is called practical.

From one point of view all graduates can be divided into two classes: those who think their knowledge is a little long for their opportunities, and those who think most anything is a little long for their knowledge. Both are apt to think that the knowledge they have acquired will become the essence of performance. You will soon find that knowledge does not have much to do with effectiveness. It is necessary only as words are to the expression of thought. You will find knowledge a good tool, but not the vital force with which you perform. You will fall back upon human effort and action and discover that it is the human engine and not the knowledge engine that does the work.

Cultivate singleness of purpose. This is more important than you may think. It is intuitive with the comparatively ignorant, and often absent in the highly trained. We are

frequently surprised at the great competency of the ignorant contractor or foreman, on whom judgment is often passed by saying that he is a practical man and gets results. Analysis will show that his best quality is singleness of purpose, which leads him to do vigorously the one thing before him, without distraction following from knowing or thinking about too many other things. The broadening power of education and training increases the range of contemplation, but unless the power of concentration is cultivated there follows a tendency to scatter instead of to acquire that singleness of purpose which leads to effective action. David Starr Jordan has said: "The purpose of knowledge is action. But to refuse action is to secure time for the acquisition of more knowledge. It is written in the very structure of the brain that each impression of the senses must bring with it the impulse to act. To resist this impulse is to destroy it. . . . This lack of balance between knowledge and achievement is the main element in a form of ineffectiveness which, with various others, has been uncritically called degeneration." Thus President Jordan shows how even much more than a little knowledge may be a dangerous thing. The highly-trained man therefore needs, as a complement to his training, unusual powers of concentration, in order that the virtue of singleness of purpose may not be lost. This faculty a man must have or acquire for himself. It is not in the books. It cannot be taught. It can only be suggested by precept and example.

From directness of purpose naturally follows diligence in getting what you go after, and not being easily turned aside by resistance. When you are getting what you go after, get it all. Avoid the mediocrity of compromise. Be thorough

and stand for full competency in everything, from main essentials to details. Just so far as education, assisted by concentration, contributes to singleness of purpose, it is useful; but where by length, breadth or depth it dilutes human effort, it lacks value. It is, therefore, not so much the question how much educational training you have as it is how you use it. Some can use a little with great effect because their point of view is right; others scatter so badly that they cannot use their knowledge at all; while some distorted minds seem to have a faculty for misapplying a large amount of acquired knowledge through complicated processes full of error. To be right, you must be one hundred per cent right. Charity may pardon human nature its percentage of delinquency, but this is a human matter. The laws of nature, mathematics, and engineering do not pardon anything. The man may therefore be absolved from censure, but his work must stand the rigid test of inviolable law. Nor is it too much to say that you must be right the first time. Much of our engineering is only done once, and it must be done right that once. A man who has learned by experience to do a thing deserves no credit for doing it right. He is then only a repeating machine. Real power is characterized by a man's ability to do right the first time that which he never did before. Such performance involves the power to assimilate and adapt experiences, of more or less like or unlike kind, in a way to bring forth correct results. This is the true use of experience, wherein a man is a thinking, active power, and not a mere repeater.

Clearness of thought is an essential often lacking. This, too, follows from concentration and singleness of purpose. Many minds confuse themselves with a wealth of ideas,

grading from well-formed thought to hazy, indistinct conceptions. You can clear your mind by proper habits of thought. Train yourself to separate essentials and non-essentials and confine your consideration to the essentials; to distinguish between what you know and what you only vaguely surmise, clearly eliminating opinion from facts. Nothing is more helpful than conference with yourself, in which you determine what you think of your own thoughts. This is aided by the moderate cultivation of system — thinking in an orderly manner, beginning at the beginning, ending at the end, and being sure to have a middle. With this there should be no slavery to system; each should find his own logical way.

Besides what are commonly known as ideas, men have intuitions which they cannot readily prove. These I believe are identical with reason, except that while reason is composed of a sequence of distinct ideas, each capable of expression, intuitions follow from the capacity of the human mind to integrate small ideas and impressions, each of which is too small to stand alone, or to be readily expressed, but which integrated, form a concrete mental impression, called an intuition, which is of exactly the same character as reason, except that it is composed of smaller and almost intangible units. Do not, therefore, discard intuitions as inferior to reason. Analysis will sometimes develop intuition into an expressible logical thought.

You have all had ideas and you will have more of them. Some ideas seem bigger than others. These mental forces, like other forces, only do work when in motion. Hence your ideas are only valuable when put into execution, and this often requires more talent than to originate them. Some

men seem to consider their ideas so good that they will execute themselves.

A point of view is involved in the power to rationalize. This again is a thing which each man does for himself in his own best way, and its essence consists in asking one's self whether the thing is reasonable. It is a great check upon error. It applies equally to nearly everything of which engineering is composed. It is the power of the human mind, after performing in more or less systematic and conventional ways, to stand off and look at results and ask whether they are reasonable. One man will figure that certain material weighs two hundred tons, and believe it. Another will say that there is something wrong in that, for it all came on two cars.

Every young man comes sooner or later upon a dilemma, in which he is more or less drawn in opposite directions by his confidence on the one hand and timidity on the other; a desire to perform backed by the courage of his convictions, but on the other hand resisted by his inability to see his way through in orderly progression to a desired end. This is the time to show your nerve. Do not be dazed and baffled. Make a start! Use your wits and you will get somewhere, and if you cannot always see the end it will constantly get nearer and plainer when you go as far as you can see and then see how far you can go.

Another point of view concerns engineering expression.

This may be through designs, drawings, mathematical determinations, or words, and finally by work done. The lamest of these is words. All engineering is so non-literary in character that the use of language is too much neglected, leading to expressions that do not properly convey thought.

In engineering, it is not rhetoric but diction that makes expression clear, and diction is best learned from the dictionary. It is well for a young engineer to cultivate his vocabulary, and learn to use words in their right sense. They are then usually understood, even by those who have less knowledge. A word of caution, however, against assuming that a lack of facility of expression can cloak an absence of knowing what you think. Engineering documents, specifications and letters are full of misstatements due to the careless use of language. Conciseness can not be overestimated. Brevity is desirable, but not at the expense of clearness. Conversely, a certain degree of facility should be acquired in reading the words of others. Some seem incapable of understanding plain language when spoken or written. Any one persistently failing to understand the language of others has limitations needing correction.

One of the worst traits in engineering, which is fundamentally born of conceit, tends to fasten error, censure, and responsibility on others. There are times when a man needs to stand himself up in front of himself and ask: What is the matter with me? The capacity of any man to admit his own error and failure of judgment is a measure of strength rather than weakness.

Perhaps no personal traits are of greater importance in the conduct of the business affairs of an engineering life than cheerfulness and non-contentiousness. Not only because these are right and agreeable, but because they enable a man to work better, and to be better understood. They also add weight to his opinions. There is a certain reasonable optimism of manner which makes a man and his ideas welcome even though they must of necessity

sometimes be critical. To vote aye and believe that things can be done makes a man helpful to others and to enterprises. Discontent is not a sign of progression.

Each of you probably has a preconceived notion of following some line of engineering. Be careful about your self-analysis. The field is large and has room for all of the various types of men, some of whom incline to constructive operations, others toward invention, others still toward contemplation. Again, within all these divisions, some tend toward professional and others toward trade work. No one can advise what is best for you. This you must find out for yourself. I cannot help, however, a certain predilection in favor of a young man being just an engineer, and not any particular kind of an engineer, not specializing while too young, but developing along versatile lines, ready to turn his hand equally well to any task within his general scope. In this, there is a good deal in the point of view, and the man who believes he can apply himself in one direction about as well as another will come nearer doing it than one who thinks he cannot.

When you start your practical work you will doubtless try to improve things. That is a legitimate purpose, if not overworked. I am not going to attempt to tell you what needs improvement, but the one improvement that most things need is in the line of sufficiency. You can think this over for yourself and apply it where it fits.

Remember that all the good you accomplish is going to come out of yourself. You cannot borrow it and you cannot make it out of that which has been poured into you by education or otherwise. All that you receive is only a certain quantity of knowledge, acquired by education, ex-

perience, or other training, which will have a certain influence upon what comes out of yourself as your own. It is the inherent capacity to perform with your own brain which will make you what you become, and not the mere transmission of that which you have acquired. Your knowledge, therefore, is of little avail until you make it inherently a part of yourself through mental assimilation and utilization. The more clearly you comprehend these things, the more readily you can make use of them as against the process of mere acquirement, with a vague motive that, in some way or other, what you acquire may be of benefit, or that environment will be the force that makes your talent effective. Some have gone through experience without acquiring it, and many a man who has received an education has failed to use it because he allowed it to be a thing apart from his personality, and it slipped away.

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